



Republic of Ghana

NATIONAL SEED PLAN

(PLAN FOR THE IMPLEMENTATION OF THE NATIONAL SEED POLICY)

April, 2015

ACKNOWLEDGEMENT

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FOREWORD

When the Government of Ghana adopted the National Seed Policy in June, 2013, it was with a sense of urgency and purpose: that matters concerning the seed sector of Ghana should be so handled as to enhance the facilitative role of seeds in ushering in an era of modern and productive agriculture.

In so expeditiously drawing up a National Seed Plan following the adoption of the National Seed Policy, government again demonstrates its continuing conviction that the seed sector holds a major key to the attainment of food security and agricultural productivity. Since the National Seed Plan will constitute the basic document by which the intentions expressed in the seed policy are to be realized, MOFA has gone to great lengths to ensure that the plan proposes guidelines which conform to the particular circumstances and requirements of Ghana's agriculture, as expressed in all relevant national instruments. Towards that end, all stakeholders, experts, development partners and potential beneficiaries including farmers, scientists, seed producers, policy makers, economists and industrialists, have been consulted in developing the National Seed Plan.

A holistic approach has been adopted in this plan and all segments of the seed sector have been addressed. Firstly, the private seed sector is to be strengthened to lead in the commercial components of the sector; a number of interventions are planned which will strengthen the support services that are required to enhance the performance of the private sector; and interventions have been proposed to address the gaps in the strategic components of the seed sector, including the informal seed sector, seed security and the seed needs of traditional food crops. In addition, the need to ensure an effective oversight and coordination of the seed industry is to be assured through the strengthening of the secretariat of the National Seed Council. The ten project profiles proposed in the plan are indicative only. They serve to expose the gaps and opportunities and open the way towards a wide array of roles and actions that partners may unearth as they analyse the rationale of the plan and consider the various institutional and technical reforms that are called for.

Ghana has travelled far on the road towards a modern seed industry and now stands on the crossroads of making a breakthrough. It is gratifying to note that during this period of seed plan formulation, there is a convergence of partner-assisted seed projects which are addressing specific components of the seed industry. MOFA highly appreciates this and encourages that the National Seed Plan should be allowed to shape the priorities and actions of on-going projects, while also serving as a blue print for the planning and implementation of future investments and interventions.

Permit me to re-echo my message delivered at the final stakeholder seed plan validation workshop held in Accra: Let the spirit of participation and collaboration which guided stakeholders to so

meticulously compose the seed plan serve also to ensure the utmost level of collaboration and thoroughness in effectively implementing the National Seed Plan. May this plan serve as a useful guide in all interventions that may be needed to develop our overall seed sector and may its implementation lead to our cherished goal of a modern agriculture, food security and economic prosperity.

Hon. Minister of Food and Agriculture

A MESSAGE TO STAKEHOLDERS AND PARTICIPANTS

(EXTRACT OF SPEECH BY THE HONOURABLE DEPUTY MINISTER OF FOOD AND AGRICULTURE (CROPS), DR AHMED YAKUBU ALHASSAN DELIVERED AT THE NATIONAL SEED PLAN FINAL VALIDATION WORKSHOP ON THURSDAY 5 FEBRUARY, 2015 AT THE OAK PLAZA HOTEL, SPINTEX ROAD, ACCRA)

Mr. Chairman,

Resource Persons,

Representatives of Donors and Partner Institutions,

Directors of MOFA,

Participants,

Invited Guests

Ladies and Gentlemen:

I am very privileged to be here, on behalf of the Honourable Minister of Food and Agriculture, and be part of a process very dear to the Ministry. I would first of all like to thank the organizers for inviting me to this validation workshop and on behalf of the Honourable Minister, my sincerest gratitude goes to the Alliance for a Green Revolution (AGRA) and International Fertilizer Development Centre (IFDC), which readily agreed to engage the Consultants and provided the necessary funds to drive this process. I would also like to appreciate the consultants and all other resource persons who have devoted their time, energy and resources to prepare the draft National Seed Plan document that will form the basis for the discussions at this validation workshop.

Mr. Chairman, Ladies and Gentlemen, in June, 2013, Ghana adopted a National Seed Policy which would guide the development of the national seed sector. Speedy, effective and comprehensive implementation of the National Seed Policy is critical if the stated objectives and outputs of the policy are to be achieved. Mr. Chairman, it is important to note that, unless the policy is implemented, it remains a collection of statements of intentions and exerts no influence. It is also important to point out that many areas identified in the seed policy are already receiving some level of attention and for those areas, implementation will just mean that there will now be more conscious realization of their importance or critical role in the overall seed industry apparatus and be therefore granted additional urgency and support. However, several other areas in the policy will require new support initiatives in which relevant partners will be expected to act as sponsors and implementers side by side with government effort. For both categories, a plan must be developed to serve as guidance in the several interventions that will be required in the short, medium and long-term.

The National Seed Plan will be expected to create an environment conducive for the orderly growth as well as comprehensive and balanced development of the seed industry. The plan should send out

signals to all potential actors, enabling them to take up their necessary positions and play their own roles adequately.

Mr. Chairman, ladies and gentlemen, in recent years, seed issues have assumed great international dimensions of critical political and economic importance and many issues have emerged from a wide range of topics such as genetic resources exploitation, modern germplasm technologies, transnational monopolies, farmers rights, etc. While we guide and assist our farmers to embrace the best that modernity offers, we will be alive to the challenges that modernity poses but always mindful that the continued dependence of majority of our farmers on farm-saved seeds and seeds from local markets, which may simply be grain, cannot be the way forward towards achieving increased agricultural productivity.

From the participants' list and the calibre of resource persons aligned for this validation workshop, I see that the organizers have endeavoured to ensure the maximum participation of relevant stakeholders, so that the final product will reflect the best efforts and expert opinions of all of Ghana's seed industry experts. The high level of consultations is to ensure that the plan is consistent with our overall national philosophy, conforms with the overall agricultural policy, of high quality, and of utmost relevance to the circumstances of Ghana. Further, the participatory approach should ensure a wide sense of ownership and foster close collaboration among stakeholders of the seed industry during implementation.

MOFA strongly believes that Ghana's current agricultural achievements can further be improved; and the seed sector is one of the important areas which can contribute towards the required improvement. Therefore, reorganizing the seed sector will contribute towards enhancing Ghana's agriculture to attain its full potential and be able to play its future food security role creditably.

Mr. Chairman, ladies and gentlemen, Government notes with appreciation the overwhelming support our Donor Partners have accorded the seed industry. Never in the history of the Ghana Seed Industry has so much goodwill and concern been so displayed as now and this should lead us now to make a major breakthrough in our efforts to build a credible seed industry which will support the National Agricultural Plans. I particularly wish to pay tribute to the long standing efforts of USAID dating back to the 70's and culminating in current efforts through projects such as the Agricultural Technology Transfer Project with the IFDC, Scaling Seeds and Technology Partnership project with AGRA, and the West Africa Seed Program. USAID still continues as our strongest ally in the seed sector. Other equally important projects such as the FAO-sponsored seed projects, the ISSD programme by the Government of Netherlands and other partners, continental initiatives such as the AU-ASBP and AfricaSeeds, contributions from seed development supporters such as GIZ and the

World Bank all hold good prospects for Ghana's seed industry development. We are grateful to all our development partners.

Regarding investments and entrepreneurship in the seed sector, we are happy that our changed policy of giving up to the private sector the commercial components of the seed sector is now bearing fruits. We are encouraged by the gradual growth of the local private seed sector in response to this new policy and we wish to challenge them to assist to take this country's seed future into our own hands. We are also very much encouraged by the interest shown by the international corporate bodies in our seed industry, which attests to good results from our efforts lately to create an enabling environment for good seed business. My advice to our international friends who aim to join in our efforts in the seed industry is that, it is our preference to achieve a home-grown seed industry. Accordingly, as soon as product development has been successfully completed, foreign seed companies should strive for local-based seed production.

Mr. Chairman, I throw a challenge to the seed experts gathered here to do due diligence to the current draft of the seed implementation plan in order to enrich the document. I am aware that two other validation workshops have already been organized in Kumasi and Tamale which have enriched the original plan. I have no doubt that the brains assembled here will help to further improve the document. But more importantly, the achievement of a credible seed industry, supportive of our agricultural goals, will depend eventually on how all of you, in your various institutions, sectors and programmes, translate the seed plan into practical activities. I have no doubt that you will not be found wanting when the time comes.

Mr. Chairman, ladies and gentlemen, as soon as the National Seed Plan document receives the necessary clearances and approval, MOFA will start consultations with all stakeholders to open the way towards implementation of the recommendations and strategies in the National Seed Plan, which should emerge as a very important tool in our agricultural development.

I thank you all for responding to our call and wish you a very successful and happy workshop.

Thank you.

Hon. Deputy Minister of Food and Agriculture (Crops)

Dr Ahmed Yakubu Alhassan

TABLE OF CONTENTS

ACKNOWLEDGEMENT	I
FOREWORD	II
A MESSAGE TO STAKEHOLDERS AND PARTICIPANTS	IV
TABLE OF CONTENT	VII
LIST OF TABLES	IX
ABBREVIATIONS AND ACRONYMS	X
EXECUTIVE SUMMARY	1
1.0 BACKGROUND AND CURRENT STATUS OF THE SEED INDUSTRY	1
2.0 PREPARATION OF A NATIONAL SEED PLAN: PROJECTS AND PROGRAMMES FOR THE SEED INDUSTRY	1
2.1 THE BASIS OF THE NATIONAL SEED PLAN	1
2.2 JUSTIFICATION AND RATIONALE OF THE SEED PLAN	2
2.3 METHODOLOGY	2
2.4 CATEGORIZATION	2
3.0 PROFILES OF PROPOSED INTERVENTIONS OF THE NATIONAL SEED PLAN	3
4.0 PROJECT BENEFITS	3
4.1 OVERALL ECONOMIC BENEFITS	3
4.2 AUXILIARY PROJECT BENEFITS	4
5.0 RESOURCE MOBILIZATION	4
THE NATIONAL SEED PLAN	5
1.0 INTRODUCTION	5
1.1 CURRENT STATUS OF THE SEED INDUSTRY IN GHANA	6
1.2 SOURCES OF SEEDS	7
2.0 PROJECTIONS AND TARGETS	8
2.1 CERTIFIED SEED PRODUCERS	9
2.2 RECENT SEED SECTOR STUDIES	10
2.3 ON-GOING SEED SECTOR PROJECTS	11
3.0 BRIEF SUMMARY OF THE NATIONAL SEED POLICY	12
4.0 PREPARATION OF THE NATIONAL SEED PLAN	16
4.1 THE BASIS OF THE NATIONAL SEED PLAN	16
4.2 KEY MESSAGES FROM THE NATIONAL SEED POLICY	17
4.3 JUSTIFICATION AND RATIONALE OF THE SEED PLAN	18
4.4 RESPONSIBILITY	21
4.5 METHODOLOGY	21
4.6 CATEGORIES OF INTERVENTIONS	21
4.7 STYLE OF PROJECT PRESENTATION	24
4.8 PREPARATION OF FULL INVESTMENT PACKAGES	24
4.9 TIMING AND ORDER OF PROJECT IMPLEMENTATION	25
5.0 PROFILES OF PROPOSED INTERVENTIONS OF THE NATIONAL SEED PLAN	26
5.1 DIRECT PRIVATE SECTOR INTERVENTIONS	26
<i>P1: Strengthening the Role of the Private Sector in the Ghana Seed Industry</i>	<i>26</i>
<i>P2: Developing the Private Sector Seed Marketing</i>	<i>30</i>
<i>P3: Assisting the Private Seed Sector with Improved Infrastructure</i>	<i>35</i>
5.2 SUPPORTIVE SERVICES FOR SEED INDUSTRY GROWTH	37
<i>P4: A Strong Seed Value Chain for a Vibrant Seed Industry</i>	<i>37</i>
<i>P5: Ensuring Adequate Human Resources for the Seed Industry</i>	<i>46</i>
<i>P6: Strengthening the Plant Genetic Resources Base of the Seed Industry</i>	<i>49</i>
5.3 ADDRESSING GAPS IN THE STRATEGIC COMPONENTS OF THE SEED SECTOR	52
<i>P7: Catering for the Seed Needs of Traditional Crops</i>	<i>52</i>
<i>P8: National Seed Security Project</i>	<i>55</i>
<i>P9: Facilitating the Positive and Contributory Role of the Informal Seed Sector in Ghana</i>	<i>58</i>
5.4 SEED SECTOR GOVERNANCE AND COORDINATION	61
<i>P10: Strengthening the National Seed Council Secretariat</i>	<i>61</i>

6.0	PROJECT BENEFITS	65
6.1	APPROACH AND METHODS.....	65
6.2	OVERALL ECONOMIC BENEFITS OF PROJECTS	66
6.3	AUXILIARY PROJECT BENEFITS	69
6.3.1	Human Resource Development and Job Creation.....	69
6.3.2	Ease on Government Budget.....	69
6.3.3	Knowledge Enhancement in the Seed Industry.....	69
6.3.4	Increased Production of Improved Seeds in Ghana	70
6.4	RISK ANALYSIS	70
6.5	PROJECT SUSTAINABILITY	73
6.6	PROJECT EXIT STRATEGIES	74
6.6.1	Rationale	74
6.6.2	Proposed Strategies	74
7.0	SUMMARY OF PROJECT PROFILES.....	75
8.0	RESOURCE MOBILIZATION.....	75
9.0	MONITORING AND EVALUATION	76
	ANNEX 1: TECHNICAL COMMITTEE FOR THE PREPARATION OF THE NATIONAL SEED PLAN	77
	ANNEX 2: GHANA SEED INDUSTRY PARTNERS.....	78
	ANNEX 3: PARTNERS SPONSORING THE PREPARATION OF THE NATIONAL SEED PLAN	85
	ANNEX 4: CURRENT SEED INITIATIVES IN GHANA AND THEIR EXTENT OF CONTRIBUTION TO PROPOSED SEED PLAN PROJECTS.....	86

LIST OF TABLES

Table 1: Summary of Project Profile	3
Table 2: Status of Certified Seed Production Figures for Selected Crops in Ghana: 2011-2013	7
Table 3: Targeted SRR's and Certified Seed Production from 2016-20	8
Table 4: Projected Seed Requirements (All Classes) 2016-2020	9
Table 5-P1-1: Strengthening the Role of the Private Sector in the Ghana Seed Industry	26
Table 6-P1-2: Estimated Budget for the Project 'Strengthening the Role of the Private Sector in the Ghana Seed Industry'	29
Table 7-P2-1: Developing the Private Sector Seed Marketing.....	30
Table 8-P2-2: Estimated Budget for the Project 'Developing the Private Sector Seed Marketing'	34
Table 9-P3-1: Assisting the Private Seed Sector with Improved Infrastructure	35
Table 10-P3-2: Estimated Budget for the Project 'Assisting the Private Seed Sector with Improved Infrastructure'	37
Table 11-P4-1: A Strong Seed Value Chain for a Vibrant Seed Industry	37
Table 12-P4-2: Estimated Budget for the Project 'A Strong Seed Value Chain for a Vibrant Seed Industry'	45
Table 12-P5-1: Ensuring Adequate Human Resources for the Seed Industry	46
Table 14-P5-2: Estimated Budget for the Project 'Ensuring Adequate Human Resources for the Seed Industry'	49
Table 15-P6-1: Strengthening the Plant Genetic Resources Base of the Seed Industry.....	49
Table 16-P6-2: Estimated Budget for the Project 'Strengthening the Plant Genetic Resources Base of the Seed Industry'	52
Table 17-P7-1: Catering for the Seed Needs of Traditional Crops	52
Table 18-P7-2: Estimated Budget for the Project 'Catering for the Seed Needs of Traditional Crops'	54
Table 19-P8-1: National Seed Security Project	55
Table 20-P8-2: Estimated Budget for the Project 'National Seed Security Project'	57
Table 21-P9-1: Strengthening the Informal Seed Sector in Ghana	58
Table 22-P9-2: Strengthening the Informal Seed Sector in Ghana	60
Table 23-P10-1: Strengthening the National Seed Council Secretariat	61
Table 24-P10-2: Estimated Budget for the Project 'Strengthening the National Seed Council Secretariat'	64
Table 25: Crop Output and Value in USD for Year 2013	67
Table 26: Projected Increase in Value in USD as a Result of 15% Increase in Crop Yield	67
Table 27: Net Present Value (NPV) and Internal Rate of Return (IRR)	68
Table 28: Risk Analysis	72
Table 29: Sustainability Analysis	73
Table 30: Summary of Project Profiles.....	75

ABBREVIATIONS AND ACRONYMS

AEAs	Agricultural Extension Agents
AFSTA	African Seed Trade Association
AGRA	Alliance for Green Revolution in Africa
BNARI	Biotechnology and Nuclear Agriculture Research Institute
CBOs	Community Based Organizations
CDI	Centre for Development and Innovation
CGIAR	Consultative Group on International Agricultural Research
CIDA	Canadian International Development Agency
CIMMYT	International Maize and Wheat Improvement Centre
CRI	Crop Research Institute
CSIR	Council for Scientific and Industrial Research
DAES	Directorate of Agricultural Extension Services
DCS	Directorate of Crop Services
ECOWAS	Economic Community of West African States
ERP	Economic Recovery Programme
FAO	Food and Agriculture Organization of the United Nations
FASDEP II	Food and Agricultural Sector Development Policy II
GAIDA	Ghana Agro-Input Dealers Association
GAPs	Good Agricultural Practices
GGDP	Ghana Grains Development Project
GIPC	Ghana Investment Promotion Centre
GIZ	German International Aid
GLDB	Grains and Legumes Development Board
GMO	Genetically Modified Organisms
GoG	Government of Ghana
GSC	Ghana Seed Company
GSID	Ghana Seed Inspection Division
GTZ	German Technical Cooperation
IARCs	International Agricultural Research Centres
IFAD	International Fund for Agricultural Development
IFDC	International Centre for Fertilizer and Agricultural Development
IPRs	Intellectual Property Rights
ISF	International Seed Federation
ISTA	International Seed Testing Association
MESTI	Ministry of Environment, Science, Technology and Innovation
METASIP	Medium Term Agriculture Sector Investment Plan
MOFA	Ministry of Food and Agriculture
MOF	Ministry of Finance
NGOs	Non-Governmental Organizations
NSC	National Seed Council
NSIA	National Seed Industry Association
NSP	National Seed Policy
NSS	National Seed Service
OECD	Organization for Economic Cooperation and Development
PGRFA	Plant Genetic Resources for Food and Agriculture
PGRRI	Plant Genetic Resources Research Institute
PPRSD	Plant Protection and Regulatory Services Directorate
QPM	Quality Protein Maize
RTIP	Root and Tuber Improvement Project

SARI	Savannah Agricultural Research Institute
SEEDPAG	Seed Producers Association of Ghana
SMU	Seed Multiplication Unit
SRID	Statistical Research and Information Directorate
UG	University of Ghana
UN	United Nations Organization
UPOV	Union for the Protection of New Varieties
USAID	United States Agency for International Development
WSP	World Seed Project

EXECUTIVE SUMMARY

1.0 BACKGROUND AND CURRENT STATUS OF THE SEED INDUSTRY

Quality seeds are a prerequisite to successful agriculture and constitute a major pathway for the achievement of national food security goals. Therefore, there is great need to ensure the availability and widespread utilization of quality seeds adapted to the crop lands where the varieties are to be grown.

Ghana's seed industry started in 1958 and was operated through various public sector entities until 1989 when the Government adopted the privatization option, paving the way for a new Ghana Seed Programme in which the private sector would take over the commercial components of the seed industry while the public sector would continue its responsibility for the activities having a service nature. However, the seed industry has continued to face many challenges including weak institutional linkages and unclear mandates, inadequate collaboration among participating partners, poor oversight arrangements and inadequate resources to support both public servicing agencies and the fledgling private seed entities. Further, the commercial dimensions of the seed have remained very narrow and certified seeds produced and distributed make up only a small percentage of total seed used, even for the main crops, maize and rice. This has left a huge share of about 80% of the major seeds used in the country emanating from the informal seed sector.

2.0 PREPARATION OF A NATIONAL SEED PLAN: PROJECTS AND PROGRAMMES FOR THE SEED INDUSTRY

In June 2013, Ghana adopted a National Seed Policy by which the inequities in the seed sector are to be addressed. For the effective implementation of the National Seed Policy, a National Seed Plan, which would serve as an implementation plan or strategy, is required to be prepared. The preparation of the National Seed Plan has therefore been based on guidelines established in the National Seed Policy.

2.1 The Basis of the National Seed Plan

The National Seed Plan is inspired by two pillars which are clearly discerned from specific statements in the National Seed Policy:

- i. Government of Ghana is committed to not only relegating the responsibility for leadership in the commercial components of the seed industry to the private sector, but also in diverse ways facilitating it to assume that role expeditiously.

- ii. Recognizing that several support services which do not hold immediate prospects for commercialization are nevertheless imperative for the overall effective conduct of the seed industry, Government is pledged to assume supportive responsibility for such service areas.

2.2 Justification and Rationale of the Seed Plan

Operationalizing the ambitions and intentions expressed in the Seed Policy should eventually result in improvement in the performance of the seed sector and lead to an increase in the availability of affordable and quality seeds of superior varieties for farmers. This requires both the bringing into effect of important institutional reforms as well as strategic investments in key functions of the seed sector.

2.3 Methodology

A participatory approach was adopted in the preparation of the National Seed Plan. First, seed industry data was assembled and formed a guide in the process of selecting broad and narrow areas of the seed policy statements and elaborating them into implementation profiles. Initial opinions and drafts were then subjected to intense stakeholder consultations and the drafts were progressively updated at stakeholder workshops in Kumasi and Tamale. The resultant draft was further validated at a final stakeholders' conference in Accra.

2.4 Categorization

The plan analyses the current status of the seed industry and, based on the conclusions, proposes broad areas of reforms that must be undertaken, particularly the key areas of concern as the private sector gears up to assume its leadership role in the seed industry. Following that, the interventions aimed at addressing the identified problem areas have been proposed.

The interventions are grouped into four clusters, namely:

- Direct Private Sector Interventions
- Supportive Services for Seed Industry Growth
- Addressing the gaps in the strategic components of the seed industry
- Seed Sector Governance and Coordination

3.0 PROFILES OF PROPOSED INTERVENTIONS OF THE NATIONAL SEED PLAN

Based upon the categorization above, profiles have been prepared and their overall summary is as follows:

Table 1: Summary of Project Profile

Project Profile	Budget Allocation (\$)
Direct Private Sector Interventions	
1. Strengthening the Role of the Private Sector in the Ghana Seed Industry	2,541,000.00
2. Developing the Private Sector Seed Marketing	4,939,000.00
3. Assisting the Private Seed Sector with Improved Infrastructure	8,144,000.00
Supportive Services for Seed Industry Growth	
4. A Strong Seed Value Chain for a Strong Seed Industry	5,958,000.00
5. Ensuring Adequate Human Resources for the Seed Industry	3,062,000.00
6. Strengthening the Plant Genetic Resources Base of the Seed Industry	902,000.00
Addressing Gaps in the Strategic Seed Sector Components	
7. Catering for the Seed Needs of Traditional Crops	6,232,000.00
8. National Seed Security Project	3,402,000.00
9. Facilitating the Positive and Contributory Role of the Informal Seed Sector in Ghana	4,495,000.00
Seed Sector Governance and Coordination	
10. Strengthening the National Seed Council's Secretariat	1,312,000
Total Estimated Project Cost	40,987,000.00

Source: Author

4.0 PROJECT BENEFITS

The benefits accruing from the identified seed projects have been assessed at three levels: overall economic/financial benefits, the economic benefits of individual projects, and auxiliary benefits.

4.1 Overall Economic Benefits

An increase in crop yield of at least 15% arising from the implementation of the national seed plan package has very important economic implications for both the economy of Ghana and the household income of the rural farmer especially. It has been calculated that the projects will result in a total increase in value of all the included crops of about USD 196,182,000.00 annually. This amount will significantly contribute to the agricultural Gross Domestic Product (GDP) of the country. A calculated

positive Net Present Value (NPV) of USD 393,310,317.49 means that the National Seed Plan is viable and therefore worthy of implementation.

4.2 Auxiliary Project Benefits

Other collateral but important and significant benefits relate to enhanced Human Resource Development and Job Creation, easing on Government Budget and enhancement of knowledge of the seed industry.

5.0 RESOURCE MOBILIZATION

Government is expected to serve as the main and sustainable funding source for this national concern. In all respects, provisions must be made from the national coffers to meet Government's responsibilities in the seed chain. Support is also expected from development partners who have in the past displayed a high level of support for Ghana's seed sector development and currently continue their support under various development schemes, several of which already align with the proposed projects in the national seed plan.

THE NATIONAL SEED PLAN

1.0 INTRODUCTION

Quality seeds are a prerequisite to successful agriculture and constitute a major pathway for the achievement of national food security goals. Particularly for countries such as Ghana, where agriculture is the prime mover of the national economy, there is great need to ensure the availability and widespread utilization of quality seeds adapted to the crop lands where the varieties are to be grown. Equally important, the institutions and structures required to support the implementation of the seed industry activities should be streamlined and properly equipped and managed to ensure that the seed programme plays its required role in agricultural development.

Ghana's seed sector combines both the formal and informal seed production and delivery systems. Commercial seed activities cover seeds and planting materials of several crop varieties developed, released and registered by Ghanaian institutions and produced and marketed across the country. There is a low level of seed exports, largely informal, to other countries in West and Central Africa and beyond. There is also a vigorous and lucrative private seed sector importation component covering exotic vegetable seeds.

The Ghana seed industry started in 1958 with the establishment of a Hybrid Maize Seed Multiplication Unit within the then Ministry of Agriculture. The Unit produced only hybrid maize seed until 1961 when it was converted into a Seed Multiplication Unit (SMU) which introduced other crop seeds into the seed production portfolio. By the close of the sixties, the SMU had adopted a contract grower system, whereby contract seed growers were assigned to produce all the certified seed requirements of the country. The SMU was eventually converted into the Ghana Seed Company (GSC) in 1979 with the mandate to produce all classes of seed except breeder seed of the scheduled crops. The food crops covered by the seed industry at the time were maize, rice, sorghum, groundnuts, cowpea and local and imported vegetables. Concurrent with these, other predominantly public sector institutions and parastatals (Cotton Development Board, Bast Fibre Development Board, Grains and Legumes Development Board) were set up and charged with the production and marketing of seeds of specific commodities, particularly cash crops.

As part of actions under the Economic Recovery Programme (ERP), the Government of Ghana adopted the privatization option and dissolved the Ghana Seed Company (GSC) in September 1989, paving the way for a new Ghana Seed Programme in which the private sector would take over the commercial components of the seed industry while the public sector would continue its responsibility for the activities having a service nature.

1.1 Current Status of the Seed Industry In Ghana

Although, overall, significant gains have been made in Ghana's seed development, major weaknesses still persist. The move from public sector seed delivery to a privatized function which occurred in 1989 put the responsibility of seed production and supply in the hands of the private sector, with the MOFA retaining the seed inspectorate and policy responsibilities.

It was expected that the private sector would usher in a period of efficient, widespread and profitable seed programme. This is yet to materialize and today less than 5% of Ghanaian farmers are able to access improved seed from approved sources. MOFA's objective is that farmers should not slide back to the age-old practice of on-farm seed saving, a practice which has a potential of reducing farm productivity across the country, since this will reverse the food security gains made in the past.

The failings of the seed industry are manifested in weak institutional linkages and unclear mandates, inadequate collaboration among participating partners, poor oversight arrangements and inadequate resources to support both public servicing agencies and the fledgling private seed production and supply entities. In spite of commendable initial efforts in the privatization drive, many developmental gaps have, for long, persisted and only recently began to engage the serious attention of government and development partners; and there are good signs of resurgence.

Specific seed industry challenges include the following:

- i. Low key investments in the seed sector
- ii. Poor credit availability, especially from banking institutions
- iii. Inadequate seed production, processing, storage and quality assurance capacity
- iv. Despite a fair-paced variety development and release system, dissemination and adoption of new varieties have been slow
- v. Research institutes and other public sector servicing institutions such as GLDB, GSID are under-funded and this limits their critical roles in seed multiplication.
- vi. There are serious human resource limitations, in terms of numbers and skills
- vii. Support to the private seed sector, in terms of seed promotion and marketing, is lacking or limited
- viii. Very low Agricultural Extension Agents (AEAs) to farmer ratio (1:1,500)
- ix. Inadequate use of demonstration plots to promote use of quality seeds in farming communities
- x. Obsolete and low capacities of processing facilities cause delays in the processing of seed, sometimes resulting in poor quality
- xi. Inadequate knowledge and skills among the seed value chain actors

- xii. Inadequate logistics and motivation for seed inspectors, extension staff and other stakeholders to carry out their duties in promoting the adoption and use of improved certified seeds
- xiii. Inadequate logistics and motivation for plant breeders to develop new improved varieties
- xiv. Limited coordination and forecasting among the major seed value-chain players in the seed industry

1.2 Sources of Seeds

The informal seed sector is very significant with about 80% of the major seeds used in the country emanating from that sector. But as yet, there has been no conscious attempt to engage with that sector to tap on the positive qualities that sector can bring to the seed sector. Table 1 below illustrates that, compared with the informal sector; the formal sector provides far less quantities of seeds than is desired. For example, of the three year average (2011 to 2013) total certified seed requirement for maize and rice of 23,152 and 14,000 MT respectively, only 2,634 and 2,013 MT respectively were produced representing 11.0% and 14.0% of the total requirements. Studies have revealed that only about 60% of the certified seed produced is actually sold and used, implying unacceptable carry-overs in a situation of paucity. The corresponding situations with sorghum, cowpea, groundnut and soybean are dismal. For sorghum, this is demonstrated by the three year average certified sorghum production percentage of total seed requirement of 3%, as shown in Table 1. The basis of any viable seed industry is the existence of a significantly large formal seed sector. Although several advantages accrue from some components of the informal sector in their current form, intervening in the informal sector to transform significant portions of it into the formal sector is an effective way of developing the formal sector or commercial seed industry.

Table 2: Status of Certified Seed Production Figures for Selected Crops in Ghana: 2011-2013

Factor	Averages for 2011 -2013		
	Maize	Rice	Sorghum
Total Crop Area (ha)	1,029,000	200,000	233,000
Total Qty of Seed Reqd to plant total crop area (mt)	23,152	14,000.0	1,165.0
Total Qty of Certified Seed Produced (mt)	2,634.0	2,013.0	34.7
% Certified Seed of Total Seed Requirement	11.0	14.0	3.0
% Min. Seed from Informal sector and others. #	89.0	86.0	97.0

Source: Derived from: MOFA, SRID, PPRSD 2014

For maize, includes small quantities of imported hybrid seed.

Assumptions:

Seeding rates (kg/ha): Maize: 22.5; Rice 70; Sorghum 5

The seed situation of local food security crops, such as yam, plantain and pearl millet, shows even more dismal levels of both availability and adoption of improved varieties.

2.0 PROJECTIONS AND TARGETS

In drawing up the seed plan, it is necessary to be guided by seed industry projections and targets which represent clear progress beyond the current status. For example, it is necessary to establish over the medium term what the seed demand levels, as influenced by the Seed Replacement Rate (SRR), will be. The first year of the plan will likely see an SRR which is much the same as the current situation captured in Table 1. However, based on the expected impacts of the proposed plan intervention, SRR or seed demand and consequently seed production and marketing should progressively upgrade to significantly higher figures by Year 5. From the targeted certified seed production levels, it is possible then to establish the implications for early generation seed supplies, quality assurance back up needs, size of the seed infrastructure needs, including the marketing structures. Table 2 below presents the projected SRRs for various seed types over the next five years and corresponding certified seed volumes that the market must supply. Both the SRR values and the seed supply targets then become important indicators by which the progress of the seed industry will be measured.

Table 3: Targeted SRR's and Certified Seed Production from 2016-2020

CROP	Targeted SRR's and Certified Seed Production from 2016-2020									
	2016		2017		2018		2019		2020	
	SRR (%)	QTY (MT)	SRR (%)	QTY(MT)	SRR (%)	QTY (MT)	SRR (%)	QTY (MT)	SRR (%)	QTY (MT)
Maize	11.0	2,546.7	15.0	3,472.8	20.0	4,630.4	25.0	5,788.0	35.0	8,103.2
Rice	14.0	1,960.0	18.0	2,520.0	25.0	3,500.0	30.0	4,200.0	40.0	5,600.0
Sorghum	3.0	37.5	5.0	62.5	8.0	100.0	12.0	150.0	18.0	225.0

Source: Author

Progression from an overall average SRR of about 8% to about an average of 35% indicating growth in seed marketing of 27% over a five year period for the three main crops of the seed industry, is a realistic and modest projection which, if attained, will represent a substantial increment in the size of the seed industry on which a privatized and commercialized seed industry operation can thrive. The SRR progression in maize to reach 35% in 2020 indicates that by the end of the plan period, averagely, farmers will be renewing their seed once every three years at least. This situation will be a huge improvement over the present situation where farmers renew their seeds once every ten years. The situation of rice seeds also indicate that by the end of the plan period, SRR will have increased from the present 14% to a level of 40%. This target respects the historical fact that the rice seed

industry has surpassed this level of adoption in the earlier days of commercial rice farming in Ghana and this should therefore be an achievable target.

Table 4 below is informed by the targeted certified seed production levels from 2016-2020 for the calculation of the quantities of breeder seeds and foundation seeds which will be required to support the production of the targeted levels of certified seeds for the various seed types.

Table 4: Projected Seed Requirements (All Classes) 2016-2020

CROP	Projected Seed Requirements (all classes) over 5 years (MT)														
	2016			2017			2018			2019			2020		
	BS	FS	CS	BS	FS	CS	BS	FS	CS	BS	FS	CS	BS	FS	CS
MAIZE	0.57	38.2	2,546.7	0.78	52.1	3,472.8	1.04	69.5	4,630.4	1.48	86.8	5,788.0	1.82	121.5	8,103.2
RICE	1.1	45.7	1,960.0	1.35	58.0	2,520.0	1.9	81.7	3,500.0	2.3	98.0	4,200.0	3.0	130.7	5,600
SORGHUM	0.001	0.19	37.5	0.02	0.32	62.5	0.003	0.5	100.0	0.004	0.75	150.0	0.006	1.125	225.0

Source: Author

BS: Breeder Seed, FS: Foundation Seed, CS: Certified Seed

Assumptions:

- **Maize:** Seeding rate of 22.5 kg/ha; Seed yield: 1.5 t/ha
- **Rice:** Seeding rate of 70.0 kg/ha; Seed yield 3.0 t/ha
- **Sorghum:** Seeding rate of 5.0 kg/ha; Seed yield: 1.0 t/ha

2.1 Certified Seed Producers

Certified seed producers consist of relatively small-scale individual seed producers (Seed Producers Association of Ghana, SeedPAG) and emerging domestic seed companies (organized under Seed Trade Association of Ghana, STAG). The SeedPAG group is characterized by low level entrepreneurship, low level of direct marketing and a very small portfolio of varieties. Domestic seed companies exhibit some diversity: while some are already producing hybrids and are experimenting with new, exclusive varieties, others are not much different from SeedPAG's seed producers.

Certified seed production is mainly confined to maize and rice, and to a lesser extent soybean and cowpea. For other legumes and roots and tubers, the informal seed system plays the dominant role in seed delivery.

The public institutions: CSIR, that develop new varieties, GLDB that produces foundation seed and GSID that conducts quality inspections are generally under-resourced and too weak to satisfactorily conduct their mandates. However, presently, new regulatory developments have created opportunities

for the private sector: first, the Plant and Fertilizer Act (2010) now allows organizations in the public and private sector to produce foundation seed; a National Seed Council has been established having private sector representation and broad mandate for initiating strategies and regulations; and further, the variety release procedures have been simplified and shortened.

2.2 Recent Seed Sector Studies

Arising out of the studies of the assembled seed industry documents, a number of interventions which have recently been tabled but which have so far not been pursued were identified. Some of these proposals are as follows:

A) The set of recommendations from the 2008 GIZ seed industry studies which is summarized as follows:

- i. Formulation and adoption of a National Seed Policy
- ii. Enhancement of the privatization process
- iii. Expansion of Seed Certification
- iv. Incentives for Plant Breeders
- v. Informal Seed Sector Interventions
- vi. Creation of a Seed Grower Support Unit
- vii. Rehabilitation and expansion of Seed Industry Infrastructure
- viii. Training Fellowships
- ix. Enhancing Value chain processes
- x. Improving foundation seed production and availability
- xi. An Improved Seed Use Project (Modelled after the historic FAO Fertilizer Use project)
- xii. Seed Plant Technical Audit and Rehabilitation Project

B) The proposed package of interventions proposed as part of the World Seed Project under which FAO, International Seed Federation (ISF), Organization for Economic Cooperation and Development (OECD), International Seed Testing Association (ISTA) and International Union for the Protection of New Varieties (UPOV) planned to act together to assist Ghana implement a series of projects in a program to advance the national seed industry. Some of the projects which were discussed to be implemented are as follows:

- i. Development of a sustainable quality vegetable seed production and supply system for
- ii. Increased productivity and food security in Ghana.
- iii. Breeder Seed Quality Improvement and Variety Maintenance

- iv. Conservation and promotion of indigenous and neglected crops through sustainable seed production and supply system
- v. Improved Varieties adoption and utilization
- vi. Innovations for the production and distribution of clean planting materials
- vii. Refurbishing existing seed Processing and Storage Centres

C) The national seed sector assessment carried out by the Integrated Seed Sector Development, Africa programme in 2012 identified five major types of seed systems operating in Ghana i.e. Farmer-saved seed, community based seed production, mixed public-private (local seed business), purely public and private commercial. These various seed systems are contributing to fulfill the diverse seed demand of Ghanaian farmers. The study concluded that the overall seed sector growth can be achieved with targeted interventions to overcome specific challenges faced by the different seed systems in Ghana. (Basically there are three seed systems: formal, informal and combinations of the two. Farmer saved seeds and community based seeds are all informal systems existing outside of seed certification.)

Although the above cited recommendations require to be updated to meet current realities, largely they continue to be relevant and indeed mirror several interventions that are currently proposed by national experts and to a large extent incorporated in the recently adopted National Seed Policy.

2.3 On-going Seed Sector Projects

It has been suggested that the current period of seed development is witnessing probably the most widespread donor assistance since seed development activities commenced in the 1950s. But although there is a wide range of projects which incorporate seed components, the key areas of concern as identified in the National Seed Policy and summarized in the preceding paragraphs, might not have been fully covered. The situation therefore leaves significant gaps, particularly as represented by the projects proposed in this plan. The Technical Committee found it necessary to clearly establish the current situation of donor-assisted seed-related projects and from there, establish the gaps which this plan must address. Further, an activities and gaps presentation was deemed useful in guiding development partners as to which of the proposed interventions in this plan would appropriately fit into their on-going activities. This would then enhance adoption of the project proposals by government and development partners.

Annex 4 shows the range of current donor assisted seed-related projects, indicating the objectives, overall budget, and extent of contribution to the proposed seed plan.

3.0 BRIEF SUMMARY OF THE NATIONAL SEED POLICY

The formulation and adoption of a National Seed Policy in June 2013 was the first step in the process of addressing the major weakness and inequities which have hitherto plagued the seed industry of Ghana. The National Seed Policy is aimed at establishing a blue print for the further development of the seed industry. Its adoption by Government was a landmark development since the health of the seed industry influences to a large extent the overall state of the nation's agriculture and food and nutrition security, Ghana being an agricultural country.

3.1 Main Objective

The main objective of the National Seed Policy is to support the development and establishment of a well-coordinated, comprehensive and sustainable private sector-driven seed industry through systematic and strategic approaches which would continuously create and supply new improved varieties for use by farmers and, further, support successful seed production, certification, marketing and seed security systems which will form the basis for food security and support the overall development of the agricultural sector.

The National Seed Policy document is divided into a Part A which establishes the background and justification for the policy, a Part B which contains the actual seed policy statements and a Part C which provides guidelines for the preparation of the implementation plan – the National Seed Plan.

To summarize, the policy statements in Part B call, first, for the establishment of coordination and establishment of an administrative setup for the seed policy, establish the objectives of the various components of the seed industry and propose required interventions. Then the rest of the seed policy statements cover the main components of the seed sector as follows:

i) Research and Variety Development

To enhance the support to research in the areas of upgraded human, physical and financial resources to undertake both basic and adaptive research in collaboration with partners, both internal and external, in order to derive new varieties which are most suited to the Ghanaian agro-ecologies and end use and to ensure that processes of variety testing, release and registration as well as issues of ownership and other rights are adequately addressed as per international norms and standards.

ii) Biotechnology in Crop Improvement

To progressively create the necessary platform for safe and effective use of biotechnology applications and GM crops in the national seed industry as a means of rapidly attaining the national food security goals.

iii) Seed Production

To ensure that public services devoted to the production of the early classes of seed are optimized to form a strong foundation for the seed industry and to strongly support the private sector to take up responsibility for the production of the certified seed class, initially assisting them with the outputs from the public sector mandated agencies and cushioning them to progressively develop their own breeder and foundation seeds as soon as possible.

iv) The Informal Seed Sector

To support the informal seed sector to integrate with the formal sector and systematically upgrade some of its practices with a view to portions of it eventually evolving into the formal seed sector and enhancing the growth of the formal sector and the seed industry.

v) Seed Conditioning and Storage

To ensure that past investments in seed conditioning and storage are adequately protected, maintained and efficiently deployed to meet the needs of existing public sector agencies involved in breeder and foundation seed production. Secondly, the objective would be to utilize the spare capacity of existing seed plants to service the needs of the emerging private sector, work towards privatizing any redundant seed plants and encourage the private sector to invest in this area to meet their own specific needs.

vi) Seed Regulatory Framework

- **Seed Quality Assurance**

To enhance the maintenance of high quality seeds of crop varieties at the points of production, handling and also moving in commerce.

- **Variety Release**

To ensure that materials emanating from research and eventually proposed to be introduced into the seed market as new varieties are sufficiently screened as per laid down procedures and to ensure that adequate capacity and resources have been provided to mandated institutions to conduct the variety release process efficiently and effectively.

- **Intellectual Property Rights (IPRs) (Plant Breeders' Rights and Farmers' Rights)**

To support the development and implementation of a well structured and targeted IPR legislation (PBR and Farmers' Rights) which will encourage breeders and farmers in their work to rapidly develop and release improved varieties, enhance seed accessibility and protect plant genetic products.

vii) Agricultural Extension

To create an enabling environment and develop adequate capacities for a pluralistic extension system to play its critical roles in seed production, delivery and use.

viii) Marketing

To ensure, in a manner consistent with prudent free market economics and other national goals, the regular availability of quality seed for seed users in the form, time and place they need it to guarantee crop production for food security and national development.

ix) Seed Export

To consult with all pertinent stakeholders with a view to encouraging the national seed industry to aim at producing excess seeds beyond immediate national requirement and to exploit niche markets for the export of seeds to external markets to increase foreign exchange earnings and to enhance incomes and livelihoods of producers/stakeholders along the seed value chain.

x) Seed Imports

To minimize the over reliance on imports by encouraging the local seed industry to develop their output potential; to resource/strengthen national seed regulatory bodies to undertake their responsibilities, in line with facilitative international seed trade norms and acting within the West African seed trade harmonization protocol; and to particularly encourage the national seed industry to come up with new varieties which can compete favourably with imports.

xii) Private Seed Enterprise Development

To rapidly promote the development of an active and efficient private seed sector through the creation of an enabling environment which will include effective collaboration between public and private seed enterprises and agencies, facilitative investment incentive packages and infrastructural development.

xiii) Seed Value Chain

To develop the seed sector through the enhancement and integration of the seed value chain and commodity value chain.

xiv) National Seed Security

To encourage and promote the development of steps and processes aimed at quickly restoring the productive capacity of rural populations affected by disasters so that as soon as possible, they are able to recover their livelihoods and curtail or reduce their dependence on food aid

xv) Capacity Building

To identify the infrastructural, institutional and human resource development that will be necessary to implement a comprehensive seed industry and to act in concert with all stakeholders and development partners to ensure that the required capacities exist in all the seed industry components for orderly and balanced growth of the industry.

xvi) National Funding Mechanisms

To ensure that, in implementing the National Seed Policy, adequate resources are marshalled, first and foremost from the national resources as a clear indication of the commitment of Government to the overall objective in seed industry development.

xvii) Regional And International Cooperation

- Donors

To demonstrate serious national commitment to growing a vibrant private sector-led seed industry and to encourage the donor community to provide partnership with Government in the donors' various areas of experience and interest in order to achieve a rapid transformation of the national seed industry into an efficient and effective entity.

- International Seed Associations and Institutions

To foster healthy collaborative links with relevant international seed associations and institutions, with a view to obtaining relevant technical and organizational expertise that will shape the development of the seed industry.

- **Regional Seed Sector Cooperation**

To act with member countries of ECOWAS in developing and implementing facilitative seed industry protocols and agreements which will offer mutual benefits and contribute to the development of Ghana's seed industry.

- **Continental Seed Cooperation: The African Seed and Biotechnology Programme (ASBP)**

To position the seed programme of Ghana to participate in and take full advantage of the ASBP as a programme and a framework in order to effectively collaborate with other African countries and African institutions in seed sector development as a pathway towards the food security goals of Ghana and Africa.

4.0 PREPARATION OF THE NATIONAL SEED PLAN

The effective implementation of the National Seed Policy calls for the preparation of an implementation plan - National Seed Plan- by which the statements contained in the policy document are translated into practical activities that will lead to the development of the seed sector and the seed industry, both public and private, in the short-, medium-, and long-term.

4.1 The Basis of the National Seed Plan

The National Seed Plan is inspired by two pillars which are clearly discerned from specific statements in the National Seed Policy:

Pillar 1: Government of Ghana is committed to not only relegating the responsibility for leadership in the commercial components of the seed industry to the private sector, but also, in diverse ways, facilitating it to assume that role expeditiously.

Pillar 2: Recognizing that several support services which do not hold immediate prospects for commercialization are nevertheless imperative for the overall effective conduct of the seed industry, Government pledges to assume supportive responsibility for such service areas as plant genetic resources management, research and variety development, early generation seed multiplication, seed quality assurance, agricultural extension, seed security and the seed production and supply of important traditional and food security crops which the private seed industry ignores.

By adhering to the above pillars, Government conforms to the principle that the public sector is not the best long term manager of commercial activities. Further, Government is of the view that a strong and profitable private seed sector will be able to progressively contribute its quota to seed industry development by progressively developing into an able and substantial partner in all the service areas, particularly in variety development, early generation seed multiplication and extension.

And in the area of quality assurance, which traditionally is the preserve of the public sector, the attainment, in due course, of a good record of internal corporate seed quality assurance installations and practices should form the basis for allowing licensed seed certification by which qualifying seed companies would conduct limited seed certification under the general referee oversight of the central seed certification authority.

4.2 Key Messages from the National Seed Policy

In line with the above, The National Seed Plan has drawn heavily on several key messages from the National Seed Policy, including the following:

“The main objective of the National Seed Policy is to support the development of a well-coordinated, comprehensive and sustainable private sector-driven seed industry ...”

“Government’s role in the seed industry will eventually be limited to providing support and services in the areas which are of service nature and in which the private sector is presently not adequately developed to make a contribution.”

“MoFA and its development partners will mobilize resources to support the informal sector supporting participatory strategies for on-farm management of plant genetic resources maintained by farmers through participatory plant breeding, protection of traditional knowledge, community seed banking, establishment of community seed fund and other community seed initiatives.”

“MOFA and its development partners will support the promotion of formal-informal seed sector interactions to capture the multiple opportunities offered by their complementarities to develop a well integrated seed sector”.

“Government will continue to encourage the takeover by the private sector of foundation seed production, and marketing will ensure that public sector operations in these activities are progressively minimized to avoid such public sector operations clashing with, and acting as

disincentives to the private sector seed development... Thus the goal will be to encourage private sector investment in variety development and early generation seed production.”

“In line with the strategy of developing the private seed sector ... and in order to ensure a level playing field, MoFA will always ensure adequate private sector representation on the NSC membership.”

“Government will urge a good system of consultation and collaboration among all stakeholders ... to ascertain the demand levels of all varieties ... with a view to establishing the quantities of the various seed classes for the production planning ... by public sector agencies and the private sector.”

“Government’s thinking on the issue of seed prices is in line with the axiom: “Quality seed does not cost, it pays” and will generally opt for seed prices to be established by free market forces. However, in view of the critical role of seed as a vital and strategic input for the millions of farm families, many of whom are poor, Government will closely watch the seed price level with a view to eliminating any incidences of abuse and other unfair practices.”

“A fully funded public entity with responsibility for Variety Registration will be established [both for VCU and DUS testing]”

“Government recognizes the significant role of plant breeders (both public and private sector) and farmers in developing new varieties to satisfy the seed needs of farmers and the need to reward them with incentives for continued investment in varietal development.”

The above quotes clearly show the commitment of the government to a more strict distinction between government tasks and responsibilities (public breeding, variety release, quality control and general seed-chain coordination) and private opportunities and mandates (early generation and certified seed production, internal quality assurance, variety ownership, free seed pricing).

4.3 Justification and Rationale of the Seed Plan

Operationalizing the ambitions and intentions expressed in the Seed Policy, which is the main aim of the National Seed Plan, should eventually result in improvements in the performance of the seed sector and an increase in the availability of affordable quality seeds of superior varieties for farmers. This requires both the bringing into effect of the intended policy changes as well as strategic investments in key functions of the seed sector. In that regard, based on the seed policy statements and expert opinions, the seed plan is based on the following considerations:

- The Seed Plan is based on a pluralistic approach to identify issues in both the formal, intermediary and informal seed systems. As such, targeted investments are necessary in the

area of institutional change and the enabling environment, which cater for the needs of the different types of seed systems. This will eventually serve the different needs of farmers.

- Research and strategic planting centres need to be strengthened in a way that provides sufficient scope and incentives to focus on a wide area of crops and varieties (including roots and tubers, small grains and legumes). A clearer incentive and accountability structure is required that ensures numerous outreach activities and linkages to farmer-based organizations, and small-scale seed companies.
- Although there is general agreement that a greater role for the private sector is the way forward to meet any increased seed demand, this path will also require a shift in behavior and attitude in the private sector. The current private sector is characterized by donor dependency, comfortable relationships, and modest output. The distinction between public and private responsibilities needs to be clearer, and each side needs adequate incentives to perform its role.
- The overall reform can be guided by the reinvigorated National Seed Council, which through a small but effective secretariat could coordinate both the implementation of policy changes and investment packages.
- Donor support can provide needed capacities to meet some of the objectives of the Seed Plan, but the major responsibility is with national policymakers. Probably, the highest priority contribution to vibrant seed companies will not be money but the establishment of a supportive enabling environment, with sufficient commercial incentives, clear and transparent regulations and stabilized profitable agricultural output markets.
- In this respect, the following steps – that will have very limited cost implications - need to be considered in order to gain the interest of both domestic and international seed companies: (1) market-based seed pricing for maize, soybean and rice varieties; (2) limited and targeted seed subsidies for selected crops and varieties; (3) transparent and efficient variety release procedures; (4) some level of consumer protection through seed quality inspections at seed outlets.
- Once the above issues have been addressed, seed companies still require modest support to assist them in better quality seed production (of hybrids, and foundation seed), linkages with research institutes for new varieties and breeders seed, and organized quality assurance and seed conditioning. The main emphasis should be on increasing the technical and business capacity of the seed companies, while some form of co-financing could be considered for private seed processing and quality assurance.
- For many crops the seed sector still depends on public varieties; as such, CSIR should encourage its agricultural research institutes to adopt a change in attitude and incentives. The actual uptake of varieties should be at the core of assessing an institute's performance, not the

number of released varieties. To achieve such uptake, CSIR needs to rethink their breeder seed plans and pro-actively engage with seed companies and producers to try new varieties.

- In line with above recommendations, CSIR will need to embark on a reform process that emphasizes on: greater accountability (in terms of uptake of varieties and early generation seed produced), some form of cost recovery to increase resources and investments, as well as a plan for staff and organizational incentives. A yearly variety catalogue with descriptions of key varieties in layman terms should be part of this (more service and market-oriented attitude).
- An efficient organization for foundation seed will remain necessary for most crops and varieties. This plan proposes shared governance between the public foundation seed entity, the private sector, the research institutions, and the regulatory bodies. The GLDB can be developed to fit this role and several corporate options can be considered including the PPP option. The role of GLDB will be more appreciated in the future when some private companies develop their own foundation seeds of profitable crops. It will then be left to GLDB to ensure continuous production and supply of foundation seeds for crops which are less fancied by the private seed sector. Further, even for profitable seed types, smallholder seed enterprises will likely be fully reliant on GLDB or its equivalent for their foundation seed input. Again, accountability, production planning, cost recovery and incentive structures will be key to increasing the performance of the responsible agency.
- Overall, public institutions require reform. Therefore there is need to attach to each seed plan intervention, where public institutions are implementers, partners or beneficiaries, specific reform parameters that must be met. The tasks and responsibilities of the three key public institutions should be geared at:
 - greater accountability of public resources;
 - more ambitious targets and incentives for staff of institutes to excel;
 - greater clarity in terms of, for example, variety release and quality assurance) procedures; and
 - a greater level of cost-recovery for products and services.

The National Seed Council, with a strong and professional secretariat, could play a lead role in this reform process.

4.4 Responsibility

The task of preparing the National Seed Plan has been accomplished by the Directorate of Crops Services with the assistance of a small Technical Committee of experts (see Annex 1) and with funding from MOFA and developing partners (see Annex 3).

4.5 Methodology

The main feature of the process adopted in the preparation of the National Seed Plan is the participatory nature of the consultations undertaken. The assembling of a Technical Committee respected the need to bring on board the expertise of seed technology, project management and financial and economic analysis. Following the inauguration of the Technical Committee in October 2014 and commencement of its functions, the Technical Committee moved to assemble all relevant seed industry data and information, which assisted in the analysis of the current seed industry status and influenced, or formed the basis for strategies eventually selected. The wide views of seed industry experts were incorporated via interviews and literature reviews.

The assembled data formed a guide in the process of selecting broad and narrow areas of the seed policy statements for the purpose of elaborating them into categorized implementation profiles. Initial opinions and drafts were subjected to intense stakeholder consultations and progressively updated at workshops in Kumasi and Tamale. The resultant draft was further validated at a stakeholders' workshop in Accra and the recommendations of that workshop formed the basis for the drafting of the final document in March 2015.

4.6 Categories of Interventions

The proposed interventions which make up the National Seed Plan collectively address the need to ensure comprehensive, balanced and orderly seed industry development. Addressing this need is extremely important since the components of the seed industry are delicately linked and have to act in concert with each other and in a systematic and complementary manner to ensure effectiveness. In this plan, the proposed interventions have been grouped as follows:

i) Direct Private Sector Interventions:

The National Seed Plan recognizes that the public sector is no more conducting commercial operations in certified seed production which has now been left to the private sector to conduct. This renders the goal of private sector success in certified seed production extremely important and a national concern. Therefore, interventions which directly facilitate the development and growth of the private sector form the apex activities of the seed plan. The balanced, linked and simultaneous implementation of the proposed projects will address the key areas of weakness in the national seed industry and rapidly transform the latter to form a credible basis for a modern agriculture which is a

national goal. Individually, each project brings together a cluster of related interventions which can be considered as important to the progress of the seed sector component which they represent.

The projects in this category are not known to be currently in the Government budgetary process and are therefore faced with challenges in incorporating them into the public budget process in the short term. Consequently, assistance from development partners should facilitate the rapid start up of the interventions in the short and medium term, while the support from Government and the private sector itself become more pronounced in the long term. Of particular relevance in the funding challenges is the fact that traditionally, Government's role in developing the private seed sector has mostly been facilitatory and devoid of direct capital injection.

The list of direct private sector interventions is as follows:

- Strengthening the role of the private sector in the Ghana seed industry
- Developing the private sector seed marketing
- Assisting the private seed sector with improved infrastructure

Needless to add, the size of the interventions respect that, for the business aspect of the private seed sector activities, the operators will pursue necessary funding through regular institutional financing channels, though facilitation of institutional credit should be one of the incentives to be expected from government.

ii) **Supportive Services for Seed Industry Growth**

There are areas in the value chain which, although not directly operated by the private sector, nevertheless go a long way to determine the success or otherwise of the private sector and indeed the entire industry. Pillar 2 of the seed plan, which has been described in 3.1 above, relate to the supportive services. The activities involved in these services deal with the specific hindrances which are currently seriously constraining progress in the value chain components.. The main services which require to be provided are found in research and variety development, foundation seed production, certified seed production, quality assurances, seed marketing (mostly promotional and training).

Then there is the overarching imperative to ensure adequate human resource base for the entire seed industry, both public and private sector, which calls for sustained investments in training in which both Government and development partners will need to act as main sponsors.

Another important supportive service relates to plant genetic resources management which will ensure an adequate germplasm base for the sector.

Projects covering the areas of research and variety development, seed quality assurance and provision of plant genetic resources back-up, which are considered to be of service nature, are normally at prioritization disadvantage when viewed against projects with direct and immediate revenue earning capacity. But the roles of these projects are very critical in advancing the seed industry, ensuring the industry its credibility and according it the required level of security. The proper strengthening of the selected components should establish the good health of the industry and enable the commercial components of the industry to function effectively, sustaining the private sector investments which will be attracted into the industry.

The full list of Supportive Services projects is as follows:

- A strong seed value chain for a vibrant seed industry
- Ensuring adequate human resources for the seed industry
- Strengthening the plant genetic resources base of the seed industry

iii) Addressing the Gaps in the Strategic Components of the Seed Sector :

The seed security interventions relate to the protection of the seed systems of the country as the prime activity. Other ancillary activities will be made up of extending the benefits of modern crop improvement and seed delivery to minor crops which are ignored by mainstream seed industry. Further, in recognition that the informal sector contributes to the resilience of the overall seed sector of Ghana and forms a ready pool of potential private seed sector operators for the future, a project aimed at facilitating the positive aspects of that sector will add to the seed security projects.

While the front runner funding source is considered to be Government, the number of interventions proposed, the scale of activities and the overall costs involved present considerable funding challenges. Therefore development partners may wish to consider adopting some of the activities for support, in the consideration that the seed security interventions aim at protecting the overall seed industry in which considerable investments have been made, protecting the agriculture of the nation and according the small scale farmers benefits the of an improved seed sector.

The list of projects which address the gaps in the strategic components of the seed sector is as follows:

- National seed security project
- Catering for the seed needs of traditional crops
- Facilitating the positive and contributory role of the informal seed sector in Ghana

iv) Seed Sector Governance and Coordination:

The envisaged role of the NSC as oversight entity, coordinator and advisor of the seed industry requires that it be strengthened and its secretariat properly developed and equipped to conduct a wide range of activities that fall under its mandate. These activities, termed Seed Sector Governance and Coordination actions, form crucial links in the seed policy and by their nature require considerable facilitation from the NSC. Their consolidation into a unified project management has the advantage of ensuring that their linkage and complementarity are facilitated to act as the glue which maintains the cohesiveness of the seed plan.

The single project under this heading is ‘Strengthening the National Seed Council Secretariat’

The NSC will also oversee other actions which are considered as non-project facilitatory actions as mentioned in the seed policy. These actions are clarion calls, drawing attention to important steps that need to be taken and which must be specifically facilitated.

4.7 Style of Project Presentation

To varying degrees of elaboration, each project is presented in a summary profile format, (as P1 to P10) starting with a tabular summary of title, partners, timeframe and total cost. This is followed by a brief statement containing Rationale, Objective, Expected Outputs, Activities, Required Resources, and summary budget. Respecting the linkage and complementarity of the projects, whereby the projects are seen to be jointly contributing to the overall end product, an overall financial and economic analysis is provided in Chapter 5.0.

4.8 Preparation of Full Investment Packages

It should be noted that the projects prepared in this plan are written in profile format only. They are therefore the skeletal basis for eventual elaboration into full blown project documents or investment packages, as desired. The further elaboration of a profile will require additional material such as data on resources to be allocated, location of key activities, specific products to be considered, period, budget, partners etc. The activities which have been condensed in the profile will particularly need to be elaborated based on the current situation and the specific needs at project onset. The elaborated activities should include details of reform of institutional arrangements as well as which key policy changes need implementation; additionally, financial and economic analyses are to be separately prepared for each project for the interest of supporting partners.

In all cases, the National Seed Policy should form the main source of reference in order to capture and respect the intentions and philosophy expressed in it.

4.9 Timing and Order of Project Implementation

Respecting the linkage and balance relationships among the components of the seed industry, the project implementation should be arranged to ensure that each project is able to build on or complement the outputs of the others without leaving gaps. Thus, a marketing project may build retail outlets but only when a production project has successfully led to the production of an excess to be marketed.

In consideration of the key role of the private seed sector in the implementation of the national seed plan, it is imperative to ensure that, as quickly as possible; the private seed sector is assisted to attain a good level of expertise and capacity which will qualify it to undertake its role. Consequently, the first project that must receive attention is ‘Strengthening the role of the private sector in the Ghana seed industry’. That project will position the private seed sector to be able not only to adequately prepare to implement the projects directly dedicated to it, but also serve as able and ready partner in the other interventions which are supportive of the seed industry growth. Further, in order to quickly establish a reasonable ground zero which will facilitate a meaningful take-off for all the seed plan interventions to make meaningful contributions to addressing the imbalances in the seed sector, it is proposed that the project: “A strong seed value chain for a strong seed industry” should be implemented at the same time as the project “Strengthening the role of the private sector in the Ghana seed industry”. The others will follow from Year 2. Each project will run initially for 5 years. At the end of Year 5, based on the results of M&E and stakeholder decisions, some projects may be extended, or amended or handed over to beneficiaries for continuation etc. as per exit strategies decided for the particular intervention.

At any rate, the national seed plan should not be considered as a collection of the projects presented in this document. Rather, the plan should be viewed as proposing the key areas to be addressed, suggesting the broad areas requiring institutional reforms and projecting results that will accrue from effective implementation of the proposed activities. The actual ensuing projects may be based on the proposed profiles but flexibility should be exercised to enable other modalities to be employed, so far as they broadly conform to the dictates of the seed plan and the philosophy of the National Seed Policy.

5.0 PROFILES OF PROPOSED INTERVENTIONS OF THE NATIONAL SEED PLAN

Based upon the categorization and the presentation style explained in Chapters 3.6 and 3.7 above, the following interventions are proposed as the projects of the National Seed Plan:

5.1 Direct Private Sector Interventions

PI: Strengthening the Role of the Private Sector in the Ghana Seed Industry

Table 5-P1-1: Strengthening the Role of the Private Sector in the Ghana Seed Industry

Title	Strengthening the Role of the Private Sector in the Ghana Seed Industry
Potential Implementing Partners	Private Seed Sector, MOFA Directorates of Crops Services, PPRSD & Extension, CSIR-CRI & SARI, and GLDB.
Project Duration	5 years
Funds Requested	GHS 7,624,000.00 USD 2,541,000.00

Source: Author

Rationale:

In 1989, Government signalled a shift from public sector-led seed industry activities towards reliance on the private sector to lead in all the commercial components. This was to ensure increased efficiency and capacity in the seed industry as well as minimize the burden of the escalating seed development budget on the public coffers. However in spite of laudable actions by Government and supporting partners, Government's intention that the private sector should take over certified seed production and marketing as well as other commercial components of the seed industry following the closure of the Ghana Seed Company has been slow in being realized. To date, the share of the private sector in the quality seed output remains insignificant. It is clear that innovative and concerted efforts must be made to enhance the growth of the private seed sector especially in view of the fact that Government has already withdrawn from certified seed production of the main cereal and legume crops and no alternative sources of certified seeds currently exist.

A key missing element which likely holds the key in facilitating the entry and growth of the private sector is the installation of an organized association and back up agency which mobilizes support, facilitates activities, and conducts surveys and studies aimed at smoothening the entry and growth of the private sector.

During the restructuring of the seed industry in the aftermath of the closure of the Ghana Seed Company, a National Seed Service (NSS) was established within the Directorate of the Crops Services of MOFA for the purpose of serving as the development and monitoring agency of the seed industry (both public sector agencies and the private seed sector). However, the NSS did not develop as expected and has not been continued under the newly enacted Plants and Fertilizer Act, 2010 (Act 803). The inactivity of the NSS has denied the seed industry of the all-important facilitation required for its development along private sector lines and there is therefore the need to re-establish such a body, with emphasis on the duties that need to be performed to further the interests of the private sector.

Current thinking is that the new agency would be better placed within the private sector itself, although MOFA would be expected to play complementary and collaborative roles in the formation and of the agency. Appropriately, the name of the new agency is proposed to be National Seed Industry Association, (NSIA). It would be registered as a non-profit private sector seed development agency which will be an association of seed industry entities, producers, processors. NSIA can be considered as a generic name for the proposed association. It is the opinion of some stakeholders that an existing institution should be adopted for the purpose.

The functions of NSIA will include the following:

- Provide direct support, guidance, and assistance to any private-sector agency or persons interested or participating in any activities of the seed industry.
- Serve as a focal point for the provision of assistance from relevant donors and agencies to seed industry actors and act as key lobbyist of the private sector in relevant circles.
- Gather such seed industry intelligence and data as will be required by the seed industry, particularly the private sector.
- Carry out training activities, particularly for the private sector, and provide all seed stakeholders with the required assistance in their planning and operations.
- Assist the relevant national agencies in forecasting the overall seed requirements of the country for production and marketing purposes as well as the seed adoption rate that would help determine the progress made in the industry annually.
- Assist in developing monitoring and evaluation processes to regularly review and improve on the performance of the seed sector.
- Conduct studies aimed at exposing the full dimensions of the export potential of Ghana's seed industry with recommendations on how this is to be fully and practically exploited should the country produce more seed than it requires.

- Assist Government in accelerating its efforts towards the establishment of structured private seed companies including PPP in seed enterprise development (e.g. provision of infrastructure, utility services, shareholding, etc.)

The formation of NSIA will fulfil a key policy objective of Government to assist in building a credible and viable private seed sector that will constitute the main conduit for seed delivery for the key crops in Ghana.

Objective:

The project will aim at strengthening the role of the private seed sector through the establishment of a National Seed Industry Association (NSIA) which will aid the growth of the private sector to play its required roles in the seed value chain in the shortest possible time.

Expected Results and Outputs

A well functioning and coordinated Ghana Seed Industry championed and directed by the private sector with all stakeholders working effectively and in consonance with one another.

Activities of the Project:

The project will comprise activities relating to establishment, equipping and staffing of NSIA and assisting it to commence its key activities of training, consultancy, advisory, monitoring facilitation, advocacy and mobilization. Concerted efforts will be made to assist NSIA to develop into an important development partner with Government in seed development, and particularly an implementing partner in this project.

The envisaged key steps in the implementation of the project are as follows:

- Secure the required Infrastructure (Building/Offices)
- Establishment of a functional permanent office with office equipment and furnishings
- Recruitment of permanent staff to run the office
- Provision of vehicles
- Provision of office supplies
- Provision of communication equipment
- Provision of various seed industry training for all stakeholders
- Organization of sensitization workshops
- Training and test running of the main monitoring, studies and survey functions of NSIA
- Consultations with stakeholders for formation of NSIA
- Registration and other processes for formation of NSIA

Required Resources

- Office Accommodation (Rental/Government Allocation)
- Staff costs Honoraria (Staff, consultants, contracts)
- Administrative costs
- Fixed Costs
- Recurrent Costs
- General Operating expenses

In estimating the budget required for this intervention, consideration has been given to the fact that the private sector entities have the potential of making substantial contribution to the activities to be conducted especially after the formative years up to year three. The modest proposals made below may well be exceeded when this happens and also when development partners recognize further needs that will emerge in the development process.

The estimated total budget is **GHS 7,624,000.00 (USD 2,541,000.00)** as detailed in **Table 6-P1-2 below:**

Table 6-P1-2: Estimated Budget for the Project ‘Strengthening the Role of the Private Sector in the Ghana Seed Industry’

Expenditure Type	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS
Infrastructure	156,000.00	165,000.00	99,000.00	99,000.00	108,000.00
Office Equipment & Supplies	36,000.00	39,000.00	42,000.00	45,000.00	51,000.00
Transport and Communication	544,000.00	640,000.00	641,000.00	111,000.00	122,000.00
Salaries	227,000.00	261,000.00	300,000.00	345,000.00	397,000.00
Training and Investment Activities	408,000.00	450,000.00	498,000.00	546,000.00	600,000.00
Project Total Cost	1,371,000.00	1,555,000.00	1,580,000.00	1,146,000.00	1,278,000.00
Contingency (10%)	137,000.00	156,000.00	158,000.00	115,000.00	128,000.00
Overall Total Cost	1,508,000.00	1,711,000.00	1,738,000.00	1,261,000.00	1,406,000.00
TOTAL COST (5 yrs.)	GHS 7,624,000.00				
	USD 2,541,000.00				

Source: Author

P2: Developing the Private Sector Seed Marketing

Table 7-P2-1: Developing the Private Sector Seed Marketing

Title	Developing the Private Sector Seed Marketing
Potential Implementing Partners	The Private Seed Companies, Research Institutes , GLDB, GSID, DAES, DCS, Seed Growers, Seed Retailers
Project Duration	5 years
Funds Requested	GHS 14,817,000.00 USD 4,939,000.00

Source: Author

Rationale:

Seed marketing forms the very core of a successful seed industry. Marketing links up producers with the users of the seed through a continuum of intermediaries. It provides a two-way channel – a forward linkage from breeders and seed producers to the farmer, serving to relay the response of research and extension to farmer needs; and a backward linkage - serving to send the feedback from the users of the variety to the breeder, seed producers and extension on the usefulness or otherwise of the product.

In a privatized seed industry, marketing defines and drives all the steps. The ‘seed distribution’ bias, characteristic of public seed programs, whereby the interest is to ensure the rapid and wide coverage of improved varieties per se, has to give way, in the fully privatized industry, to the situation where seed demand establishes the justification and limits of all seed industry interventions.

Seed demand establishes the actual levels of seed to be requisitioned by farmers and depends on adoption rate and seed replacement rate (SRR). In view of seed saving practices, it is important to annually determine the seed adoption rate and SRR and side by side with expert opinion, sales records and trends in previous years, to determine the demand levels which will then form the basis of all corporate and service dimensions, including production levels, inputs required, training activities, credit etc.

On the other hand farmers’ satisfaction and consequent sustainability of a vibrant seed market can be based on a number of attributes including but not limited to:

- the price of the seed,
- timeliness of availability,
- appropriateness of the size and packaging,
- varietal and physical qualities, (seed quality attributes)
- need for and availability of complementary inputs and services, and
- yield potential of the variety.

The long years of subsidized seed sales were to end with the privatization of the seed marketing effort which began in 1990s. Subsidies are generally not sustainable and act as disincentives to the full entry of the private sector into the mainstream seed industry. It has been explained that the recently introduced seed subsidy is not a reversal of the goal of free market pricing of seeds. It is rather aimed, on a temporary basis, at giving a boost to seed demand and encouraging a more widespread utilization of quality seed among small scale and poor farmers. In the long run, when beneficiary farmers have tasted the benefits of use of quality seed, their resultant enhanced patronage will contribute to elevating quality seed demand even when more realistic price levels are charged.

A direct relationship exists between seed demand and the price of the farmer's produce. Good grain prices lead to increased patronage of quality seeds in the ensuing year. On the other hand when prices of harvested produce are unduly low, as happens following a good grain harvest (partly made possible by the use of quality seeds), farmers become disillusioned and therefore are likely to purchase less quality seeds in subsequent seasons. Therefore, addressing commodity pricing can be an important action towards boosting seed demand.

Another contributory factor to low demand relates to loss of confidence by farmers due to the adulteration of seeds in the market and sale of fake seeds by unscrupulous players and this is a serious threat to formal seed sector marketing which should be checked by a combination of education, awareness creation, good packaging and product preparation as well as quality assurance processes.

Challenges in seed marketing in Ghana include the following:

- Absence of a mechanism for assessing periodic seed demand and supply
- The rate of variety introduction into the market is assessed to be good and the problem rather is how to properly market the new varieties and create awareness of them in their areas of best adaptation.
- The special problem of ensuring seed availability in remote regions and how to address this.
- Absence of a coherent seed dealer network to ensure efficient and widespread marketing.
- Absence of a well-defined strategy for access to credit (and repayment methods) by individuals and groups in seed production and marketing.
- No established seed promotion procedures or processes at suitable times of the year to bring seed information to seed industry participants.
- Inadequate storage facilities specifically built or modified for seed storage
- Lack of coordination among institutions in the seed sector to ensure appropriate delivery of seed to farmers

- Inadequate enforcement of regulations and lack of accountability among the actors in the sector
- Inadequate personnel and logistical support to promote effective monitoring of seed inspection and certification.
- Inadequate information flow and database on the location of supplies and deficit areas leading to unused stocks in one area and shortage (leading to the use of uncertified seeds) in other locations within the country.
- Lack of stability in seed and grain prices

The above problems can be addressed by the installation of effective marketing structures, including a strong network of private seed retailers on service to the farming areas, a coordinated effort by research, seed producers and extension to address product issues, demand generation and forecasting as well as issues relating to information, promotion, training and extension.

Objective

The objective of the project is to address the key issues hindering effective seed marketing in Ghana and assist in the development of a nationwide seed marketing network, including a network of rural seed retail outlets that will ensure the regular availability of quality seed for farmers in the form, time and place they need for crop production.

Expected Results and Outputs:

- Seed marketing improved at all levels.
- Private sector role in seed marketing enhanced.
- Rural seed supply improved through a network of rural seed outlets to be run by the private sector.
- Small scale seed entrepreneurs empowered to play a greater role as main seed sources in their communities.
- A system of seed demand forecasting installed.
- Seed demand throughout the country enhanced.
- Barriers to intra-ECOWAS seed trade minimized.
 - By close of the project, the following general outputs would have been realized: Small scale seed enterprises established or further developed within both the informal and formal seed sectors, to meet local farmer needs, and to support distant market development where feasible. Information system established and tracking developed for regional and seed trade.
 - Strategies developed for improved marketing and distribution.
 - 20 dedicated seed outlets established in the regions

- A demonstration plot programme established in about fifty locations
- Seed brochures and manuals prepared and widely distributed to farmers

Activities

The project will be operated by the National Seed Industry Association in close collaboration with the DCS, DAES, and GSID. It is expected that this project will take off from the outputs of the marketing components of the value chain projects which would have already started to strengthen other aspects of the marketing function.

At the beginning of the project, baseline studies will be conducted to establish the current state of seed marketing in Ghana. Particularly, assumptions and projections already made relating to adoption rate, seed replacement rate, and market shares will be validated. These parameters should also help to establish the indicators and benchmarks by which advances in seed marketing and the progress of the project will be measured.

The project will assist in the development of appropriate structures that would serve as seed outlets in selected locations in the main farming areas, to be operated on a rental basis by licensed agents. Here the project itself will install twenty dedicated seed outlets with cold storage facilities, two in each region. In other locations, the project will assist identified agents with own structures to attain seed sales capabilities. Other existing rural suppliers of related inputs will also be encouraged to sign on as seed dealers. The positioning of the rural seed outlets will respect the need to ensure that seed marketing centers are in close proximity to production sites.

The project will undertake intense training of both seed sellers and seed users particularly in order to address the issues of quality, suitability, and cropping requirements. Also, in line with the demand generation objective, the project will collaborate with DAES to mount a vigorous campaign along the lines of a 'Seed Use Project' which has been recommended from previous studies. In that campaign, variety demonstrations, rural seed trials, radio and TV publicity as well as dissemination of seed brochures and pamphlets and seed field days will be regular features.

Required Resources

- Project office
- Transport and Office Equipment and supplies
- Retail seed outlets with cold storage facilities where possible and required
- Training
- Professional studies

- Village variety demonstrations and trials
- Promotional materials, including brochures and demonstration materials
- TV and radio advertisements
- General Operating expenses

The estimated total budget of the project is **GHS 14,817,000.00 (USD 4,939,000.00)** as detailed in **Table 8-P2-2** below:

Table 8-P2-2: Estimated Budget for the Project ‘Developing the Private Sector Seed Marketing’

Expenditure Activity	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS
Infrastructure	4,000.00	1,104,000.00	1,941,000.00	1,336,000.00	591,000.00
Office Equipment & supplies	8,000.00	37,000.00	64,000.00	44,000.00	19,000.00
Transportation	462,000.00	987,000.00	117,000.00	79,000.00	178,000.00
Salaries	4,000.00	14,000.00	16,000.00	17,000.00	19,000.00
Training/Workshop	36,000.00	39,000.00	43,000.00	47,000.00	52,000.00
Cost of Professional Studies	110,000.00	121,000.00	133,000.00	146,000.00	161,000.00
Advertisement	900,000.00	990,000.00	1,089,000.00	1,198,000.00	1,318,000.00
Demonstration Plots	8,000.00	8,000.00	9,000.00	10,000.00	11,000.00
Project Total Cost	1,532,000.00	3,300,000.00	3,412,000.00	2,877,000.00	2,349,000.00
Contingency (10%)	153,000.00	330,000.00	341,000.00	288,000.00	235,000.00
Overall Total Cost	1,685,000.00	3,630,000.00	3,753,000.00	3,165,000.00	2,584,000.00
TOTAL COST (5 yrs.)	GHS 14,817,000.00 USD 4,939,000.00				

Source: Author

P3: Assisting the Private Seed Sector with Improved Infrastructure

Table 9-P3-1: Assisting the Private Seed Sector with Improved Infrastructure

Title	Assisting the Private Seed Sector with Improved Infrastructure
Potential Implementing Partners	Private Seed Sector, MOFA Directorate of Crops Services, PPRSD, CSIR-CRI & SARI, and GLDB, District Assemblies
Project Duration	5 years
Funds Requested	GHS 24,431,000.00 USD 8,144,000.00

Source: Author

Rationale:

The infrastructure of the seed industry, made up of seed processing, storage and laboratory buildings, constitutes an indispensable and largest single portion of the investment in the seed industry. The development of infrastructure has in the past been undertaken through Government funding and via assistance of development partners. From the 1960s, seed processing centres were installed in Kumasi, Winneba, Ho, Tamale, Bolgatanga, and recently in Wa. Seed testing laboratories were also established in Winneba, Pokuase, Kumasi, Ho, and Tamale. Although these structures have played their desired roles in growing the national seed program, years of inadequate maintenance have led to their current low performance and in some cases they have become unserviceable and require to be replaced or massively repaired.

While the initial investments have been made by government, the current policy is to make some of the infrastructural facilities available for use by the private sector under suitable terms. At the same time, there is the need to provide new structures particularly in the middle belt of Ghana which carries a big seed production and utilization potential. Further, there is need to assist emerging seed companies to acquire in some cases their own dedicated facilities. In view of the high costs of the facilities, there is the need for some innovative interventions, either through the institutional credit processes or through PPP arrangements, whereby a project or the Government undertakes the initial funding and the private seed sector company operates the facility for the public good and with the aim of eventually defraying the investment cost.

Objective:

To identify the infrastructural resources that will be required to implement a comprehensive seed industry and to act in concert with all stakeholders and development partners to ensure that the

required infrastructure exists in all the seed industry components for orderly and balanced growth of the industry.

Expected Results and Outputs:

- A functioning seed industry endowed with requisite, properly equipped and up to date infrastructure at all the key stages of the seed value chain, contributed by both the private and public sectors and fully deployed under suitable collaborative arrangements including PPP.
- Seed Plants at Winneba, Kumasi, Tamale, Bolgatanga and Ho fully rehabilitated. Seed testing laboratories in Winneba, Kumasi, Ho, Tamale and Bolgatanga rehabilitated.
- One new seed processing/storage/laboratory complex established in the environs of Tachiman
- Two indigenous seed companies assisted to establish their own seed processing/storage facilities, possibly with co-financing arrangements.

Activities of the Project:

The envisaged key steps in the implementation of the project are as follows:

- Secure project office accommodation in offices of NSIA
- Provision of vehicles
- Provision of office supplies
- Provision of architectural and engineering services
- Nationwide seed infrastructure audit
- Construction and renovation of seed processing and storage facilities
- In-service training and demonstrations for operating staff and users

Required Resources

- Office Accommodation
- Staff costs Honoraria (Staff, consultants, contracts)
- Administrative costs
- Cost of infrastructure construction/repairs
- Cost of architectural and engineering services
- Cost of training
- General Operating expenses

The Estimated total budget for the project is **GHS 24,431,000.00 (USD 8,144,000.00)** as detailed in **Table 10-P3-2** below:

Table 10-P3-2: Estimated Budget for the Project ‘Assisting the Private Seed Sector with Improved Infrastructure’

EXPENDITURE TYPE	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS
Infrastructure Audit	68,000.00	-	-	-	-
Construction of New Infrastructure	1,200,000.00	1,320,000.00	1,452,000.00	1,597,000.00	1,757,000.00
Rehabilitation Works	4,500,000.00	3,000,000.00	3,000,000.00	1,500,000.00	600,000.00
Transportation	910,000.00	328,000.00	292,000.00	258,000.00	225,000.00
Training	33,000.00	37,000.00	40,000.00	44,000.00	49,000.00
Project Total Cost	6,711,000.00	4,685,000.00	4,784,000.00	3,399,000.00	2,631,000.00
Contingency (10%)	671,000.00	469,000.00	478,000.00	340,000.00	263,000.00
Overall Total Cost	7,382,000.00	5,154,000.00	5,262,000.00	3,739,000.00	2,894,000.00
TOTAL COST (5yrs)	GHS 24,431,000.00 USD 8,144,000.00				

Source: Author

5.2 Supportive Services for Seed Industry Growth

P4: A Strong Seed Value Chain for a Vibrant Seed Industry

Table 11-P4-1: A Strong Seed Value Chain for a Vibrant Seed Industry

Title	A Strong Seed Value Chain for a Strong Seed Industry
Potential Implementing Partners	CSIR-CRI, CSIR-SARI, GLDB, GSID, Private Seed Sector , DAES, DCS
Project Duration	5 years
Funds Requested	GHS 17,875,000.00 USD 5,958,000.00

Source: Author

Rationale:

The seed value chain is only effective if the actors along the chain attain the required strength and are able to effectively collaborate with each other and systematically build on each other’s output. The different seed value chain actors in the country, comprising researchers, seed producers, conditioners,

storage operators, quality assurance actors, input dealers, extension and farmers, have made significant contributions to the formal seed sector development since the restructuring of the Ghana Seed Industry began in the early 1990s. But despite those efforts, the seed situation in the country continues to lag behind expected performance.

Several reasons have been given for the poor performance of the seed value chain, among which are the following:

- Inadequate interaction between actors along the seed value chain.
- No platform exists for seed value chain actors in relation to idea sharing, planning and forecasting
- There is a weak link between the two relevant value chains: the seed value chain (comprising researchers, seed producers, conditioners, storage, quality assurance, input dealers, extension and farmers) and the commodity value chain (including farmers, input dealers, extension, marketers (aggregators), millers and consumers).
- Inequities in the commodity value chain and its inadequate linkage with the seed chain contribute immensely to the problem of low seed demand, the most serious hindrance to seed industry development in Ghana, as previously stated
- Specific technical and operational challenges faced by individual actors in the performance of their various roles in the seed value chain.

Presently, certified seed production even for maize, the leading field crop, is less than 10% of the required level. The informal seed sector remains the main source of seeds for farmers and seed demand remains the major bottleneck in the commercialization of quality seed delivery. At least 40% demand level for the major field crops must be attained to form a credible basis for a viable seed industry and that should be the main challenge to be confronted by this project.

As mentioned earlier, important institutional reforms to strengthen public sector support services and a clear separation between business components and strictly service entities will need to be initiated during the Value Chain Project. This will make it possible to have gained considerable basis on which to launch full blown reforms in the specific projects dedicated to the areas requiring reforms.

Objective:

The objective of the project is to strengthen the entire seed value chain from variety development, breeder seed production to seed utilization, ensuring that adequate capacities of both the public and private institutions are built to optimize their complementary roles in the chain, including start up of necessary institutional reforms proposed in the National Seed Policy.

Expected Results and Outputs:

- A functioning and well coordinated seed value chain with the various actors playing their optimum roles to ensure the availability of improved seeds at locations where they are required at the right times and in the right quantities and at affordable prices with the possibility of excesses for export to countries in the sub-region.
- A suitable general seed industry situation exists at project closure for the proper establishment and take-off of truly private and functional seed companies.

Activities:

The project will be expected to run initially for a period of five years at the end of which guidelines would have been firmly entrenched to enable the various value chain actors to continue their expected roles at optimum levels even outside of the project setting. NSIA and DCS will act as joint lead project implementers but each project component will be co-implemented with the concerned specialized agency/entity

The project activities will be undertaken, in a complimentary and balanced manner, in the main stages along the seed value chain as follows:

- Variety Release and Breeder Seed Production
- Foundation Seed Production
- Certified Seed Production (Including Processing and Storage)
- Seed Certification and Seed Quality Assurance
- Seed Marketing (Including Extension and Promotion)

The summary of activities, by component, is as follows:

a) Variety Release and Breeder Seed Production

The project will assist in streamlining the processes involved in variety release and ensure that information on released varieties is adequately prepared and popularized. As well, necessary equipment and other resources will be provided to enhance adequate production of quality breeder seed to meet the needs of early generation seed multiplication. The project will also assist the research institutions and related institutions to install and operate a programme to conserve and promote indigenous and neglected crops through sustainable seed production and supply systems for those crops. The key assistance to be provided to the responsible stakeholders, mainly research institutions, CSIR-CRI, Kumasi and CSIR-SARI, Nyankpala, BNARI, and the agricultural faculties

and research centers of the four large public universities namely University of Ghana, Legon, Kwame Nkrumah University of Science and Technology, Kumasi, University of Cape Coast, and the University for Development Studies, Nyankpala would comprise of the following:

- Support with tractors and field implements.
- Explore the different modalities to incentivize the breeders and to encourage the client-oriented variety development.
- Support to increasing the availability of improved varieties of local food security crops e.g. pearl millet, yam, plantain, and sorghum.
- Support to maintenance breeding for released varieties and annual breeder seed production.
- Rehabilitation of existing cold storage facilities for breeder seeds including stand-by generators
- Studies, surveys and programmes to start seed multiplication of indigenous and neglected crops.
- Support with laboratory seed testing equipment and research supplies
- Seed processing and handling equipment and supplies
- In-service training and sensitization workshops.
- Assistance towards elaboration of relevant regulations and protocols including plant variety protection regulations, breeders rights guidelines, farmers rights, and participatory breeding arrangements.

b) Foundation Seed Production

The main activity at this stage will consist of assistance to foundation seed producers (public and private) to determine the full dimensions of the country's foundation seed requirements through systematic consultations among the key stakeholders and practical assistance to GLDB, the mandated public foundation seed producer, to produce the types and quantities required.

The key activities involved are as follows:

- Institutional reforms including steps towards PPP option for GLDB and improvements in its commercial dimensions
- Develop foundation seed production guidelines to encourage private sector partnership.
- Stakeholder workshops for sensitization and information gathering
- Training on production and handling strategies
- Provision of field and laboratory equipment for quality assurance
- Provision of handling and storage equipment and facilities
- Provision of tractors with basic implements, planters, harvesters,
- Provision of transport for conveyance (inputs and outputs), distribution and monitoring.

As part of studies leading to the formulation of a PPP enterprise out of GLB, serious consideration will need to be given to the proposal by the private seed sector representatives that, based on the enormous experience and set up of GLDB, the latter should be re-equipped to carry out the following functions:

- Be the “Carpenters’ Apprentice Shop” to offer practical hands on on-farm skills training (short term and medium term) to the seed companies on seed enterprise management, seed production, seed processing and conditioning/storage, quality assurance, seed sales, distribution and marketing as different from the academic disciplines carried by the universities
- Conduct practical training on implementation of approved/recommended agronomic practices to achieve the yield potentials of released varieties.
- Operate as a resource centre for research into activities like feasible storage systems in the agro-ecological zones, seed sales and distribution and provision of extension support to farmers etc.

Certified Seed Production (Including Seed Conditioning, and Storage)

Activities to be carried out in certified seed production would include assistance to determine the certified seeds requirements of the country and also meet the special training needs of seed producers in areas they lag behind in production methodologies for both open-pollinated varieties and hybrids. The project will also assist selected seed producers to upgrade their practices to be able to produce foundation seeds when required.

The project will also assist in determining the adequacy or otherwise of seed conditioning and storage facilities and processes and pave the way for the project dedicated to this area: “Assisting the private seed sector with improved infrastructure”. As part of the preparatory work for the dedicated project, the project will engage in awareness creation and training to enhance the skills of seed producers in seed handling. Assistance will be provided towards the construction of new facilities resulting from private sector investment.

The key activities involved in certified seed production are as follows:

- Stakeholder workshops for sensitization and information gathering
- Training on special seed production needs and handling strategies
- Facilitation of private seed sector acquisition of seed processing and storage facilities
- Support to certified seed producers with haulage trucks for carting of produce as well as for distribution and marketing

c) Quality Control and Seed Certification

The main activity in the quality control and seed certification component will be support to GSID to be able to undertake activities that would sensitize the seed value chain, especially seed producers, on seed quality improvement. The project will also support GSID to carry out education and awareness on the role of the Seed Law in the production of high quality seeds. Support will also be given in the areas of provision of vehicles and laboratory equipment to enable the GSID perform at optimal levels.

While equipping and strengthening GSID to improve the certification processes relating to the current mandated seed types, efforts will be made to begin a process to expand the list of certifiable seed types. This will involve drawing up necessary standards, establishing procedure for admitting varieties and agreeing on registration and other responsibilities.

The key activities involved are as follows:

- Workshops and seminars for sensitization and information delivery on certification standards and improvement of seed quality to stakeholders
- Provision of transport to enhance seed inspections and other quality assurance operations
- Provision of laboratory equipment and seed testing supplies (to upgrade to ISTA standard and accreditation).
- Systematic incorporation of other seed types and quality assurance options (QDS) into the certification process.
- A systematic and progressing effort to groom advancing private sector seed companies to participate in licensed seed certification.
- Develop guidelines and implement accreditation of internal quality assurance system to private seed sectors.

d) Seed Marketing

The main activity of the marketing component will consist of assistance to determine the full dimensions of the country's seed market potential and identify marketing channels and potential points of seed sales countrywide through systematic consultations among the key stakeholders. The project will assist in identifying new opportunities in marketing which need to be installed to cater for the needs of an enhanced seed industry.

The project will also assist in strengthening seed promotion by empowering MOFA extension and others to mount demonstrations and trials that would contribute towards enhancing seed demand for

the main seed types of the project. As well, the project will make efforts to identify and act on steps that will enhance affordability and accessibility of seeds among farmers.

The key activities involved are as follows:

- Sensitization and information workshops and seminars by stakeholders to determine the full dimensions of the country's seed market potential and identification of marketing channels and potential points of seed sales countrywide.
- Training on special needs in seed handling, distribution and marketing strategies
- Provision of transport to enhance seed distribution and marketing
- Seed promotion activities including variety demonstrations and trials

f) Required Resources

- General Operating expenses

Research

- Support with tractors and field implements
- Rehabilitation of existing cold storage facilities for breeder seeds including stand-by generators
- Studies, surveys and programmes to start seed multiplication of indigenous and neglected crops.
- Support with laboratory seed testing equipment and research supplies
- Seed processing and handling equipment and supplies
- In-service training and sensitization workshops

Foundation Seed

- Stakeholder workshops for sensitization and information gathering
- Training on production and handling strategies
- Field and laboratory equipment for quality assurance
- Handling and storage equipment and facilities
- Tractors with basic implements, planters, harvesters,
- Transport for conveyance (inputs and outputs), distribution and monitoring
- Studies towards formation of PPP for foundation seed production

Certified Seed Production

- Stakeholder workshops for sensitization and information gathering
- Training on special seed production needs and handling strategies
- Facilitation of private seed sector acquisition of seed processing and storage facilities

- Support to certified seed producers with haulage trucks for carting of produce as well as for distribution and marketing

Quality Control and Seed Certification

- Workshops and seminars for sensitization and information delivery on certification standards and improvement of seed quality
- Transport to enhance seed inspections and other quality assurance operations
- Laboratory equipment and seed testing supplies
- Studies leading to plans for a unified certification and variety registration agency
- Preparation and introduction of licensed certification

Seed Marketing

- Sensitization and information workshops and seminars by stakeholders to determine the full dimensions of the country's seed market potential and identification of marketing channels potential points of seed sales, countrywide.
- Training on special needs in seed handling, distribution and marketing strategies
- Provision of transport to enhance seed distribution and marketing
- Seed promotion activities, including variety demonstrations and trials

The estimated total budget for the project is **GH¢ 17,875,000.00 (USD 5,985,000.00)** as detailed in **Table 12-P4-2** below:

Table 12-P4-2: Estimated Budget for the Project ‘A Strong Seed Value Chain for a Vibrant Seed Industry’

	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS
Infrastructure	400,000.00	440,000.00	484,000.00	-	-
Plant/Machinery/Equipment	963,000.00	650,000.00	-	-	97,000.00
General Operating Expenses	29,000.00	32,000.00	35,000.00	39,000.00	42,000.00
Transport and Communication	1,243,000.00	2,099,000.00	1,214,000.00	776,000.00	854,000.00
Farm input	128,000.00	141,000.00	155,000.00	170,000.00	187,000.00
Labour	117,000.00	125,000.00	138,000.00	151,000.00	167,000.00
Seminars/Workshops	781,000.00	727,000.00	799,000.00	879,000.00	967,000.00
Storage Bags	200,000.00	220,000.00	242,000.00	266,000.00	293,000.00
Project Total Cost	3,861,000.00	4,434,000.00	3,067,000.00	2,281,000.00	2,607,000.00
Contingency (10%)	386,000.00	443,000.00	307,000.00	228,000.00	261,000.00
Overall Total Cost	4,247,000.00	4,877,000.00	3,374,000.00	2,509,000.00	2,868,000.00
Total Budget for the 5 years	GHS 17,875,000.00 USD 5,958,000.00				

Source: Author

P5: Ensuring Adequate Human Resources for the Seed Industry

Table 132-P5-1: Ensuring Adequate Human Resources for the Seed Industry

Title	Ensuring Adequate Human Resources for the Seed Industry
Potential Implementing Partners	Research Agencies, GSID, Private Sector companies, GLDB, DAES, DCS, Seed Growers, Seed Retailers
Project Duration	5 years
Funds Requested	GHS 9,186,000.00 USD 3,062,000.00

Source: Author

Rationale:

Human resource and physical development and institutional capacity building are critical for the development of the seed industry. Expert areas that are especially important for the development of the industry are variety development and release, seed production, seed quality assurance, seed marketing and extension, seed security management and entrepreneurship development.

The presence of a stable cadre of subject matter experts is critical for the development of the seed sector. In Ghana most of the trained manpower which resulted from the donor-assisted training programmes in the sixties to the eighties has retired. In addition there has been a high attrition rate which still continues. There is a shortage of breeders, technical and field staff. While several of the required training courses will need to be staged in overseas universities, it is gratifying to note that significant advances have been made in local universities in the development of seed technology courses. These courses provide the basis for full seed technology and other seed industry curricula which will not only serve the needs of the growing national seed industry but also be useful to other countries in the region and beyond.

Further, the project will need to make training more relevant to the needs of Ghana's seed industry, giving more emphasis to seed industry middle level staff and artisans, developing better seed growers and reaching larger numbers of farmers in seed awareness

Training is also required for other institutions involved in seed production such as GLDB, GSID and the private seed companies. The scientists, technical field staff and farmers involved in the various operations need to keep abreast with the latest expertise and developments in their field and must constantly ensure the grooming of the next batch of national staff to take over from them.

Another group of players requiring seed training are agricultural extension officers. The role of the regular agricultural extension agents encompasses all areas of agriculture. Therefore, the initial training of extensionists does not place emphasis on seed. Consequently, these agents are not initially

adequately specialized on seed matters for effective transfer of some technologies related to seed. They require to be given additional training to properly position them for seed extension, education, and promotion. There is also a need to complement the training effort with the provision of farmer training materials (brochures, fact sheets on released varieties) for enhanced technology transfer.

Objective

The objective of the project is to identify the institutional and human resource development needs that will be necessary to implement a comprehensive seed industry and to act in concert with all stakeholders and development partners to ensure that the required trained manpower exists in all the seed industry components for orderly and balanced growth of the industry.

Expected Results and Outputs:

- Massive improvements in the human resources available to the seed industry at all levels achieved
- A cadre of graduate seed technologists available to man all the key service areas as managers
- Professionally trained seed technicians available to enter the private seed sector
- Adequate technical staff for field and laboratory work trained
- Adequate seed specific extensionists trained
- A large number of farmers trained in seed appreciation to improve seed demand and participate in promotion activities, participatory breeding, and on farm trials and demonstrations

Activities

The project will set up a small coordinating and implementing office within the Directorate of Crops Services, which will work closely with all stakeholders particularly the public and private seed industry institutions, the universities and relevant MOFA Directorates to define the precise dimensions of the human resource needs of the seed industry. The project will mount various training activities including fellowships at both local and foreign institutions for senior and medium level personnel and field technical staff, run on the job practical training sessions and seminars and conduct on-farm practical training. Opportunities for training will be extended equally to the public and private sector personnel on the basis that the two sectors play equally important complementary roles in seed industry development. However the project will also be available to assist the private sector companies in their own self-funded customized training activities.

The project experts and resources will assist existing seed training institutions in Ghana to further develop their seed training curricula and update their seed course equipment and materials to be conversant with the requirements for low level as well as degree courses and beyond. Where

particular courses are not available, the project will fall on the assistance provided by development partners to send students to overseas courses at specialized seed knowledge institutions. The project will encourage use of local university training opportunities and assist in the provision of additional resources that will enable local universities to play their required role. Dialogue will be established which should lead to selecting one local learning center to be developed into a top seed training facility for Ghana and beyond. Such an institute could also serve as a center for non-academic training including practical, vocational, and other non-formal seed related technical training required for day to day running of the seed industry.

Inputs

- Establishment of a Training Office
- Transport and Office Equipment and supplies
- Staff Costs
- Establishment of Training Funds:
 - Graduate Fellowships
 - Technical Training
 - Management and Organizational training Courses
 - Conferences and Workshops
 - On the job training activities
 - Farmer practical training
- Promotional materials, including brochures and demonstration materials
- General Operating expenses

The total estimated budget for the project is **GHS 9,186,000.00 (USD 3,062,000.00)** as detailed in **Table 14-P5-2**.

Table 14-P5-2: Estimated Budget for the Project 'Ensuring Adequate Human Resources for the Seed Industry

Expenditure Activity	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS
Office Furnishing	13,000.00	5,000.00	-	-	-
Transportation	17,000.00	199,000.00	21,000.00	23,000.00	25,000.00
Salaries for Office Staff	4,000.00	4,000.00	5,000.00	5,000.00	6,000.00
Promotional Materials	20,000.00	22,000.00	24,000.00	27,000.00	29,000.00
Office Consumables	6,000.00	9,000.00	7,000.00	-	-
Training	-	1,373,000.00	2,229,000.00	2,460,000.00	1,818,000.00
Project Total Cost	60,000.00	1,612,000.00	2,286,000.00	2,515,000.00	1,878,000.00
Contingency (10%)	6,000.00	161,000.00	229,000.00	252,000.00	188,000.00
Overall Total Cost	66,000.00	1,773,000.00	2,515,000.00	2,767,000.00	2,066,000.00
TOTAL COST (5 years)	GHS 9,186,000.00 USD 3,062,000.00				

Source: Author

P6: Strengthening the Plant Genetic Resources Base of the Seed Industry

Table 15-P6-1: Strengthening the Plant Genetic Resources Base of the Seed Industry

Title	Strengthening the Plant Genetic Resources Base of the Seed Industry
Potential Implementing Partners	CSIR-CRI & SARI, GLDB, MOFA Directorate of Crops Services, PPRSD, Private Sector, Farmers
Project Duration	5 years
Funds Requested	GHS 2,706,000.00 USD 902,000.00

Source: Author

Rationale:

Plant Genetic resources are the raw materials from which new varieties of crops are developed. They are either indigenous material representing the national heritage of germplasm endowment or selected materials from research and breeders, obtained locally or as products of collaborative programmes

with external research centres. Since local germplasm forms the basis of adaptation to local agro-ecological conditions, their careful protection and management constitutes a major national priority.

Currently, the CSIR-PGRRI is the national genetic resources agency and operates a national gene bank. It is responsible for a programme of continuous germplasm collection, characterization, registration, storage, both in-situ and ex-situ, and to eventually make the stored materials available to research for their work of developing new varieties. The PGRRI, under the provisions of the National Seed Policy, is also charged to obtain and store samples of all released crop varieties for documentation, conservation, reference and security purposes.

The critical work of PGRRI is seriously threatened by lack of facilities and operational funding. If the gaps are not addressed, the basis of the national seed industry will be significantly eroded and the national seed industry will be prone to irretrievable loss of valuable national genetic heritage. Interventions are urgently needed to restore critical equipment and facilities to the PGRRI, restart their operational processes for the recovery of their functions and train newly recruited staff as well as refresh the expertise of existing staff. Training and awareness creation workshops will need to be conducted to promote cooperation among partners and to assign specific roles to all stakeholders.

Objective

The objective of the project is to strengthen the capacity and capability of the PGRRI in its function of operating the national gene bank and conducting the required genetic resources management processes of collection, documentation, characterization, conservation and enhancement of germplasm to form the foundation of the seed industry and to protect the national germplasm endowment.

Expected Results and Outputs:

- A fully rehabilitated and equipped PGRRI resourced with adequately trained staff and knowledgeable and cooperative partners with capacity to properly serve as the lead manager of the national gene bank as well as custodian of the germplasm source for the national seed industry.

Activities:

The project will form a direct assistance to the PGRRI which will therefore serve as implementer as well as coordinator of all the envisaged project activities. The project office will be located at the headquarters of PGRRI at Bunso. Only presently available staff will be assigned to specific duties required under the project. The project will be designed to incorporate other plant genetic resources

activities by universities and research agencies who will be expected to cooperate with PGRRI in the project.

At the beginning of the project, a study will be commissioned to define the status of PGRRI operations and present detailed guidelines of all interventions proposed. Based upon this audit, the necessary structures and equipment required to restore PGRRI to proper functioning will be drawn up for procurement/construction as necessary. The project will conduct a series of training sessions to train the staff of PGRRI and other related cooperating research institutions in the activities required for proper genetic resources management.

Other training activities will be aimed at training partners in the conduct of their particular roles as well as sensitize and create awareness on plant genetic issues among stakeholders.

The project will strengthen the role of PGRRI in conserving released crop varieties and further conserve also important and popular indigenous varieties on the basis that they will be found useful for further breeding work or emerge as commercialized varieties in their own rights.

Required Resources:

- Staff Costs (Consultants, contracts)
- Vehicle and office supplies
- Cost of studies, surveys and analysis
- Equipment costs
- Construction costs
- Training costs

The estimated total budget of the project is **GHS 2,706,000.00 (USD 902,000.00)** as detailed in **Table 16-P6-2** below:

Table 166-P6-2: Estimated Budget for the Project ‘Strengthening the Plant Genetic Resources Base of the Seed Industry

EXPENDITURE TYPE	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS
Infrastructure	90,000.00	60,000.00	-	-	-
Plant/Machinery/Equip	239,000.00	305,000.00	-	-	124,000.00
Office Equipment	125,000.00	20,000.00			
Office Consumable	12,000.00	13,000.00	14,000.00	15,000.00	17,000.00
Training	101,000.00	111,000.00	122,000.00	134,000.00	147,000.00
Transportation	240,000.00	270,000.00	126,000.00	139,000.00	151,000.00
Project Total Cost	692,000.00	779,000.00	262,000.00	288,000.00	439,000.00
Contingency (10%)	69,000.00	78,000.00	26,000.00	29,000.00	44,000.00
Overall Project Cost	761,000.00	857,000.00	288,000.00	317,000.00	483,000.00
TOTAL COST (5yrs)	GHS 2,706,000.00 USD 902,000.00				

Source: Author

5.3 Addressing Gaps in the Strategic Components of the Seed Sector

P7: Catering for the Seed Needs of Traditional Crops

Table 17-P7-1: Catering for the Seed Needs of Traditional Crops

Title	Catering for the Seed Needs of Traditional Crops
Potential Implementing Partners	CRI, SARI, GLDB, MOFA-DCS, DAES, PPRSD, GSID, PGRRI, Private Sector
Project Duration	5 years
Funds Requested	GHS 18,696,000.00 USD 6,232,000.00

Source: Author

Rationale

The seed industry of Ghana has been dominated by issues relating to true seeds of key cereal and legume crops. The absence of vegetatively-propagated crops in the formal seed sector is a reflection of the difficulties in handling vegetative planting materials and the rather uncertain planting material demand patterns in respect of these crops. However the importance of these crops to food security cannot be overemphasized since in many locations and under several circumstances their availability

is even more critical than field crops. Therefore, if they continue to remain outside seed production and supply programs, their contribution to agriculture is minimized and they fail to make the desired impact on food security.

The national seed policy has given full recognition to the above stated situation and calls for efforts to be made to reduce the existing gap. As a start, MOFA Agricultural Stations are to be supported to establish strategic planting material centres which shall serve as a source of vegetative planting materials for fruits, vegetables, root and tuber crops and tree crops, which have been developed by research or derived from acclaimed local germplasm. In a way this constitutes a recovered activity since agricultural stations have carried out such functions in the past.

Additional to serving as an important source of planting materials, the centres will also serve as in-situ conservation points, source for seeds of traditional crops not covered by the private sector and extension and training locations for farmers in crop propagation and husbandry matters.

The centres can also double as variety demonstration sites in their catchment areas to enable indigenous farmers around the centres to learn at first hand of new technologies and agro-practices recommended for particular crops. It is noted that MOFA already has an on-going programme to rehabilitate the agricultural stations. The Project: “Catering for the Seed Needs of Traditional Crops” should therefore be presented as a complementary activity to the on-going MOFA effort. The project should also be aimed at enhancing technology transfer activities to be conducted at the rehabilitated stations.

Objective

To rehabilitate propagation and supply of vegetative planting materials, tree crop seeds, as well as cereal, legume, and vegetable seeds not covered by private companies through the rehabilitation of existing strategic planting material centres. The project will also aim at developing new centres at existing agricultural stations to enable vegetatively-propagated and tree crops play their critical roles in seed security.

Expected Results and Outputs:

- At least 15 rehabilitated and fully functional planting material centers located at current agricultural stations and serving as source of planting materials and knowledge on tree crops
- Knowledgeable staff and cooperating farmers skilled in planting material matters

Activities:

The project office will be located at the DCS in Accra with the actual project activities spread across the participating agricultural centres. Depending upon the specific location of a centre, it may well be

found expedient to adopt PPP arrangement for the establishment and running of a centre which then could allow the private sector, including farmers, to collaborate with the public sector in running the centre. The incorporation of the private sector should improve the commercial dimension of the centres and enhance their sustainability.

At the beginning of the project, a study will be commissioned to establish the current state of vegetative propagation and the requirements as to types and methodologies per each proposed stations. The project will also agree with the concerned MOFA units, farmers, and other stakeholders regarding the technology transfer activities that will be required to be conducted at the project sites. The implementation will cover land preparation, nursery development, orchard development and training of staff in specific skills.

The project will also undertake training activities aimed at imparting skills to tree crop farmers, and provide advice to address planting material enquiries and also supply materials to the farming public.

The project will liaise closely with research and other stakeholders to collect the best available germplasm which will include both research generated materials and popular and important local varieties. The project will assist in the identification and conduct of technology transfer activities such as fertilizer rate determination, planting rate recommendations, variety selection, and IPM advisories etc.

Required Resources:

- Staff Costs (Consultants, contracts)
- Rehabilitation costs for physical structures at the Centers
- Vehicle and office supplies
- Cost of studies
- Equipment costs
- Orchard establishment
- Training costs
- Cost of trials and demonstrations
- General Operating expenses

The project is estimated to cost **GHS 18,696,000.00 (USD 6,232,000.00)** as detailed in **Table 18-P7-2 below:**

Table 18-P7-2: Estimated Budget for the Project ‘Catering for the Seed Needs of Traditional Crops’

EXPENDITURE TYPE	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS

Infrastructure	1,800,000.00	1,980,000.00	2,178,000.00	2,396,000.00	2,635,000.00
Orchard Establishment	90,000.00	99,000.00	109,000.00	120,000.00	132,000.00
Training	56,000.00	62,000.00	68,000.00	75,000.00	82,000.00
Transportation	525,000.00	739,000.00	942,000.00	1,149,000.00	1,295,000.00
Office Equipment and Supplies	76,000.00	84,000.00	92,000.00	101,000.00	111,000.00
Project Total Cost	2,547,000.00	2,964,000.00	3,389,000.00	3,841,000.00	4,255,000.00
Contingency (10%)	255,000.00	296,000.00	339,000.00	384,000.00	426,000.00
Overall Project Cost	2,802,000.00	3,260,000.00	3,728,000.00	4,225,000.00	4,681,000.00
TOTAL COST (5yrs)	GHS 18,696,000.00 USD 6,232,000.00				

Source: Author

P8: National Seed Security Project

Table 19-P8-1: National Seed Security Project

Title	National Seed Security Project
Potential Implementing Partners	GLDB, MOFA Directorate of Crops Services, GAIDA, CRI, SARI, NADMO, NSIA
Project Duration	5 years
Funds Requested	GHS 10,207,000.00 USD 3,402,000.00

Source: Author

Rationale:

Agricultural disasters affecting seed availability and access on a nationally significant scale are rare in Ghana. There has so far not been a deliberate policy-driven seed relief mechanism instituted to meet the needs of vulnerable communities following disasters although FASDEP II sets the establishment of emergency seed relief mechanism as one of the national agricultural goals.

Seed security processes have been conducted on an ad hoc and intermittent basis and to date Ghana does not have a credible seed disaster risk management arrangement in place to meet seed related emergencies. The fact that Ghana has not been regularly prone to such emergencies should not serve as justification to perpetuate this situation. Preparedness is the cardinal principle in dealing with emergencies and in the seed sector, the situation is no different.

Critical issues to consider are:

- Inadequate or insufficient or lack of preparedness for dealing with risks.
- Lack of recognition of the value and opportunities for resilience in germplasm, crops and seed sources and strategic seed reserves.
- Poor arrangements for forecasting.
- Absence of long term mitigation plans for response to climate change.
- How to secure seed supply even in situation of crisis, climate change and food price crisis.
- Potential conflicts between seed security projects and seed sector development

Objective

The objective of the project is to assist in the development of a seed security system by which the seed production and supply systems can be quickly restored to maintain the productive capacity of rural populations affected by disasters so that as soon as possible, they are able to recover their livelihoods and further, to enhance the continuous availability of and access to quality seeds under all conditions, both good and bad.

Expected Results and Outputs:

A well designed and coordinated seed security system that is able to assist in the rapid recovery of seed systems and the restoration of seed supplies in the immediate aftermath of seed related emergencies.

Activities:

The project will foster the collaboration of a wide range of stakeholders to design and test the main components of the seed security system, as per the following steps:

- MOFA, through GLDB and DCS, will work with relevant partners, including NSIA to develop strategies for responding to crisis and emergencies - disaster risk management framework – which contain components of preparedness, response and transition to development.

The technical details will, among others, cover the following:

- A well planned seed buffer stock arrangement will be installed in partnership with the private sector and other seed industry actors in a manner that will minimize expense and ensure also protection of breeder and foundation seed stocks which will be needed to restore the seed systems, if necessary, in the aftermath of distress.
- Establish a Seed System Security Assessment that provides analysis of the national seed systems and collects specific data on vulnerable regions of the country.

- Establish an early warning system that will determine as quickly as possible when actions are needed.
- Develop activities to secure the stability of seed production even in situations of crisis, by, for example, strategic deployment of irrigation facilities for part of the foundation seed requirement.
- Arrange a high level collaboration with NADMO.

Ghana has an established overall disaster mitigation programme, NADMO. The proposed project will be integrated into NADMO’s processes in a collaborative manner in order to benefit from the expertise, resources, and experience of NADMO, and achieve a more holistic approach in disaster response, while recognizing the special needs of the highly technical nature of seeds.

- Explore possibility of cooperation with other members of ECOWAS to develop a regional context for emergency seed assistance, enabling neighbours to stand ready to assist each other in times of need.

Required Resources:

- Staff Costs (Consultants, contracts)
- Vehicles and office supplies
- Cost of studies, surveys and analysis
- Seed production and storage costs
- Cost of buffer stock operations
- General Operating expenses

The total budget of the project is **GHS 10,207,000.00 (USD 3,402,000.00)** as detailed in **Table 20-P8-2** below:

Table 20-P8-2: Estimated Budget for the Project ‘National Seed Security Project’

Expenditure Type	Year 1	Year 2	Year 3	Year 4	Year 5
Consultancy Fees	54,000.00	59,000.00	65,000.00	72,000.00	79,000.00
Transport and Communication	585,000.00	644,000.00	-	-	-

Cost of Studies, Surveys and Analysis	50,000.00	55,000.00	61,000.00	67,000.00	73,000.00
Seed Purchasing and Storage	971,000.00	1,068,000.00	1,175,000.00	1,292,000.00	1,422,000.00
Storage Cost	63,000.00	70,000.00	77,000.00	84,000.00	93,000.00
Special Operating Activities	180,000.00	198,000.00	218,000.00	240,000.00	264,000.00
Project Total Cost	1,903,000.00	2,094,000.00	1,596,000.00	1,755,000.00	1,931,000.00
Contingency (10%)	190,000.00	209,000.00	160,000.00	176,000.00	193,000.00
Overall Total Cost	2,093,000.00	2,303,000.00	1,756,000.00	1,931,000.00	2,124,000.00
TOTAL COST (5yrs)	GHS 10,207,000.00 USD 3,402,000.00				

Source: Author

P9: Facilitating the Positive and Contributory Role of the Informal Seed Sector in Ghana
Table 21-P9-1: Facilitating the Positive and Contributory Role of the Informal Seed Sector in Ghana

Title	<u>Facilitating the Positive and Contributory Role of the Informal Seed Sector in Ghana</u>
Potential Implementing Partners	NGOs, FBOs, DAES, MOFA Directorate of Crops Services, GLDB, CRI, SARI, Private seed sector
Project Duration	5 years
Funds Requested	GHS 13,480,000.00 USD 4,495,000.00

Source: Author

Rationale:

The informal sector, as represented by farmer-saved seeds, on-farm seed multiplication, seed exchanges and sourcing seed from local markets is the predominant source of seeds particularly covering traditional food security crops and others not found commercially attractive by seed companies. These farmers and community-based seed systems which are unregulated and unconnected to modern crop improvement procedures, have their origins in the age-old traditional seed saving methods by which African farmers have in the past met their seed needs. The practice is by, and large, still the dominant seed source in Africa today. The informal seed sector makes up over 80% of the entire seed sector in Ghana. The informal seed sector therefore presents a huge entry point and opportunity for quality seed production, promotion of improved and farmer preferred varieties and supply to meet the seed needs of farmers. The following issues should be considered in developing the necessary approaches:

- Considering the immense importance of the informal seed sector to farmers, it is unfortunate that it had in the past not been accorded the recognition it deserved and, following from that, it had not received the necessary attention and support that would enable it to enhance its role

in agriculture. The first step in addressing the needs of the informal sector is to accord it recognition and appreciation for its role of meeting an overwhelming farmers' need. In effect, this recognition has now been accorded through the adoption of the informal seed sector policy statements in the National Seed Policy.

- However, it should also be recognized that a significant proportion of the informal sector can benefit from the use of improved varieties, sound seed management, and quality assurance practices. Therefore, while strengthening its important features, it is also possible that a significant portion of the informal sector can progressively support the development of the formal sector and contribute to the national seed sector development of Ghana. This should be a key aim of any project intervention that will be proposed.
- Further, there is need to address the limitation in extension support, and limited access to technical know-how in improved methods of seed production and processing.

Objective

The project objective is to support the informal seed sector to improve its critical features to be more useful as a source of quality seeds to the large majority of farmers who depend on it and to systematically strengthen linkages with the formal sector and contribute to the growth of the seed industry in Ghana.

Expected output

- Recognition of and priority support to the informal seed sector enhanced.
- Increased access to and use of quality seed of improved and farmer-preferred varieties by smallholder men and women farmers achieved.

Activities:

The project will undertake the following activities:

- Promote seed fairs, field demos, farmer learning tours and participatory variety trials for widespread popularization of improved and farmers preferred varieties
- Facilitate partnership with public and private seed sectors to share seed knowledge and develop suitable variety delivery systems
- Facilitate the supply of required research materials as starter seeds for informal seed actors.
- Organize on the job training to extension staff and implement tailored capacity development programme for farmer groups
- Valorise farmers traditional knowledge and local crop genetic resources to strengthen the informal seed sector performance

- Develop farmer-friendly seed quality management guidelines to support the quality seed production among farmers
- Strengthen the capacity of existing social seed exchange networks, community based groups and local seed market on access to quality seed and diffusion
- Implement co-financing mechanisms to support the development of community seed management infrastructures e.g. seed sowing equipment, small-scale seed processing equipment, community seed storage/drying facilities, and community seed banks
- Use of information management system such as Mobile based technology (e.g. SMS) and Radio to disseminate to farmers information on new varieties and quality seed in general Support to develop smallholder seed entrepreneurship for indigenous crops

Required Resources

The project will join hands with NGOs, FBOs, DCS, DAES, GSID, GLDB, Public research and private seed sector to implement this project. Mostly the project will make use of existing facilities at the disposal of FBOs, DCS, DAES and GSID but additional resources will be required for the following:

- Participatory research and farmers-extension programme cost
- A functional office space in major agro-ecological zones
- Vehicles and office supplies
- Staff costs Honoraria for studies and surveys (Staff, consultants)
- Training costs
- Cost of community based seed infrastructures
- Administrative costs
- General Operating expenses

The estimated total budget for the project is **GHS 13,480,000.00 (USD 4,495,000.00)** as detailed in **Table 22-P9-2 below:**

Table 22-P9-2: Facilitating the Positive and Contributory Role of the Informal Seed Sector in Ghana

Expenditure Type	Year 1	Year 2	Year 3	Year 4	Year 5
Community seed infrastructure	237,000.00	949,000.00	949,000.00	237,000.00	
Office Equipment & supplies	300,000.00	118,000.00	59,000.00	59,000.00	59,000.00
Transport and Communication	711,000.00	118,000.00	118,000.00	118,000.00	118,000.00
Salaries	648,000.00	713,000.00	784,000.00	862,000.00	948,000.00

Training/Seminars/workshops	890,000.00	890,000.00	741,000.00	300,000.00	148,000.00
General Operating expenses	237,000.00	237,000.00	237,000.00	237,000.00	237,000.00
Project Total Cost	3,023,000.00	3,025,000.00	2,888,000.00	1,813,000.00	1,510,000.00
Contingency (10%)	302,000.00	303,000.00	289,000.00	181,000.00	151,000.00
Overall Total Cost	3,325,000.00	3,328,000.00	3,177,000.00	1,994,000.00	1,661,000.00
TOTAL COST (5 yrs.)	GHS 13,480,000.00				
	USD 4,495,000.00				

Source: Author

5.4 Seed Sector Governance and Coordination

P10: Strengthening the National Seed Council Secretariat

Table 23-P10-1: Strengthening the National Seed Council Secretariat

Title	<u>Strengthening the National Seed Council Secretariat</u>
Potential Implementing Partners	NSC, MOFA, DCS, NSIA
Project Duration	5 years
Funds Requested	GHS 3,932,500.00 USD 1,311,000.00

Source: Author

Rationale

In order to ensure the consistent implementation and monitoring of the activities laid out in the Seed Policy and Seed Plan, a coordination and oversight body is required. Under the current Plant and Fertilizer Act (2010, ACT 803), a National Seed Council (NSC) and its Secretariat have been established to serve these functions. With the coming into force of the Seed Policy, the NSC has been given additional responsibilities to act as adviser to MoFA and Government on all matters relating to the National Seed Policy, National Seed Plan, all ensuing legislations and protocols and seed industry planning and implementation¹.

¹ From the Seed Policy (p.90/91): National Seed Council: A National Seed Committee was established under the 1972 Seed Decree. Presently renamed the National Seed Council, it has been reactivated to ensure overall coordination and development of the seed industry. The functions of the council include the following: (i) to establish policies that stimulate the development of the private sector; (ii) to review and if necessary revise the seed law; (iii) to establish the criteria for the release of new varieties; (iv) to develop seed production standards and guidelines and monitor work undertaken by the Ghana Seed Inspection Division; (v) to develop linkages between agencies involved in the production and marketing of various classes of seed; (vi) to develop guidelines that would facilitate the importation and exportation of seed. The composition of the NSC, chaired by the Minister of Food and Agriculture, is made up of Agricultural Research Institutes, University Faculties of Agriculture, Extension Directorate of MoFA, Directorate of Crop Services of MoFA, Foundation Seed Producers, Representative of Commercial Seed Producers, Seed Dealers and Farmers.

A number of intentions expressed in the Seed Policy do not necessarily require large resources. However, oversight is needed to ensure that the intentions are being monitored and followed up. A number of policy and regulatory issues have not yet been addressed in the earlier mentioned Seed Plan components. Therefore, this last package of interventions, congregated into one project, focuses on Seed Sector Governance and Coordination, aimed at ensuring the continued guidance and support of the Government, through the National Seed Council and its Secretariat, in the institutional and regulatory reform and market transition processes.

Objectives

Following the scope as outlined in the rationale, the main objectives for this package are:

- Promote a well-functioning National Seed Council that meets frequently and can make well informed decisions on the basis of the latest information.
- Facilitate coordination at the various seed industry processes: seed chain coordination (seed supply for the different seed classes, ensuring sufficient breeder, pre-basic and basic seed of the right varieties is available for quality seed production).
- Foster a better understanding between public and private interests and activities in Ghana's seed industry.

Expected Outputs

- Draft amendments to Laws, Acts and Procedures prepared
- Guidelines, Variety Catalogue and website developed
- Promote support and initiate evidence based, discussion papers and recommendations to inform decision-making prepared
- A smooth and well –functioning seed industry
- Disputes and disagreements in seed industry effectively arbitrated.
- Regular monitoring and evaluation of all seed plan projects and activities facilitated

Activities

The support to the Seed Sector Governance and Coordination package consists of two elements:

- Support to the establishment of the National Seed Council's Secretariat; and
- Other follow-up actions that stem from the intentions and ambitions of the Seed Policy.

Support to the National Seed Council Secretariat

In the context of the policy intentions and the envisaged activities from the Seed Plan, the Seed Council Secretariat requires additional capacity and resources to:

- Prepare the National Seed Council's meetings, minutes and provide follow-up actions to decisions made.

- Prepare, when necessary, and on request by the Council, amendments to the Seed Law, and Plant and Fertilizer Act.
- Prepare (evidence-based) discussion papers for seed sector reform in line with the Seed Policy's ambitions.
- Establish and amend guidelines for the release and registration of new varieties.
- Pro-actively entice support for the funding of the Seed Plan's components and the subsequent monitoring of its implementation (in the form of 3-monthly update reports).
- Facilitate meetings that strengthen seed chain coordination, between the different producers of early generation and quality seed of superior varieties.
- Ensure all information on Laws, Regulations, Procedures, Guidelines, Catalogues and Meeting Minutes is easily accessible to the public through transparent and easily digestible materials (both digitally and in hard copy).

Other activities that stem from the National Seed Policy

A number of detailed recommendations have been made in the National Seed Policy that require further policy discussions to come up with more detailed proposals for seed sector reform. A summarized, non-exhaustive, list of these topics follows below. The final prioritization of these activities will be decided upon by the National Seed Council.

1. For public sector agencies dealing with variety development, release and seed quality inspections, more resources need to be mobilized, including self-help and cost-recovery (charging appropriate fees for selected services) to complement the core Government budget. To this end, the Secretariat will develop a discussion paper together with CSIR and MoST on options for income generation.
2. The NSC Secretariat will facilitate the development of practical recommendations and guidelines for the operationalization of the biosafety legislation and procedures to meet the safety standards as per the Cartagena Protocol.
3. Facilitate and monitor the process for accreditation/licensing of quality assurance for seed companies. To this end the NSC Secretariat will develop procedures and guidelines for internal quality assurance and accreditation.
4. Pro-actively advocate that one Seed Laboratory in Ghana acquires ISTA accreditation so as to enhance participation in regional and international seed trade. To this end the Secretariat will, together with MoFA and GSID, continuously follow-up the implementation of key improvements to the Central Seed Laboratory towards ISTA accreditation.
5. Investigate and propose details of incentives that may be considered for Farmers Rights and Breeders Rights to enhance protection of Ghana's genetic resources and gain benefits from

ensuing patented products. Some inspiring practices will be developed under the guidance of the National Seed Council's Secretariat on how Farmers and Breeders Rights can benefit farmers, researchers and the private sector.

6. Monitoring the impact of specific policy initiatives on promotion, evaluation, coordination, pricing, unfair practices and commodity pricing. This continuous exercise will inform the Seed Council, based on evidence, on the seed industry development process. In addition, the information can assist the private sector to effectively engage in seed marketing. In addition, the information and analyses can inform policy makers on how to stabilize agricultural input and commodity prices.
7. Develop a (business opportunity) report that investigates the seed export potential of Ghana. The report, as guided by the Secretariat, will serve as a guide on how the potential can be exploited.
8. To develop a report to inform the private sector on encouraging examples of collaboration between seed and commodity value chains. Under the guidance of the Secretariat, inspiring practices in which seed has been a key instrument for value-chain development will be documented.
9. Assist MoFA and the Seed Council in all ECOWAS Harmonization Processes, and the Africa Seed and Biotechnology Program activities. This will enhance the seed industry's development in Ghana and Africa as a whole. In addition, the Secretariat will maintain dialogue on donor assistance to the Ghana seed industry as well as how it can be of help in seed assistance to other countries. It will assist in laying good basis for partnerships in growing the seed industry and for seed relief operations in West Africa.
10. Facilitate meetings between scientists and institutions to have regular interaction on variety release issues, to avoid duplication of efforts and minimize gaps.
11. Facilitate pilots to include selected land races into the variety release process, to encourage use of beneficial local varieties.
12. Systematically exercise oversight over key facilitatory actions proposed in the NSP.

The total budget of the project is **GHS 10,207,000.00 (USD 3,402,000.00)** as detailed in **Table 24-P10-2** below:

Table 24-P10-2: Estimated Budget for the Project 'Strengthening the National Seed Council Secretariat

EXPENDITURE TYPE	Year 1	Year 2	Year 3	Year 4	Year 5
	GHS	GHS	GHS	GHS	GHS
Office equipment and supplies	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00

Transport and communication	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00
Salaries	200,000.00	200,000.00	200,000.00	200,000.00	200,000.00
Funds for studies	400,000.00	300,000.00	300,000.00	300,000.00	300,000.00
Facilitate meetings of seed sector stakeholders	75,000.00	75,000.00	75,000.00	75,000.00	75,000.00
Communication materials	75,000.00	75,000.00	75,000.00	75,000.00	75,000.00
Project Total Cost	795,000.00	695,000.00	695,000.00	695,000.00	695,000.00
Contingency (10%)	79,500.00	69,000.00	69,000.00	69,000.00	69,000.00
Overall Project Cost	874,500	764,500.00	764,500.00	764,500.00	764,000.00
TOTAL COST (5yrs)	GHS 3,932,500.00 USD 1,311,000.00				

Source: Author

6.0 PROJECT BENEFITS

6.1 Approach and Methods

The benefits accruing from the identified seed projects have been assessed at three levels; first, the overall economic benefits that the projects will provide if they are all successfully implemented, taking into account also of complementarity. Secondly, the auxiliary benefits that are to be obtained from the successful implementation of the projects have been assessed.

Specifically, the feasibility of the projects will be assessed by the following tools: the Net Present Value (NPV), Internal Rate of Return (IRR), and the Contingent Valuation Method (CVM). The NPV as an analytical tool is a discounted measure of project worth; it is the present worth of the benefits less the present worth of the cost of the project. When using NPV, the decision criterion is to accept all projects with an NPV of zero or greater when discounted at the relevant discount rate, most often the opportunity cost of capital invested in the business.

The Internal Rate of Return (IRR) is the interest rate at which NPV is equal to zero. In simple terms, the IRR gives a measure of the break-even point of the proposed investment. For example when IRR is 115.04% as calculated for the overall package of the projects being proposed, then at the currently estimated cost of borrowing of 28%, the proposed investment shows good viability. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project.

Contingent Valuation Method (CVM) is a technique whereby willingness to pay (WTP) or willingness to avoid (WTA) are directly obtained from the respondents with respect to a specific good. CVM has mainly been used in this plan with respect to non-marketed goods and in particular for environmental goods/ resources. Some of the services which come into play in this plan have features akin to non-marketed goods and have been subjected to the CVM methodology to discern their values. Services such as provision of plant genetic resources to research, research outputs for the farming public, quality assurance back up for the seed industry, and services to farmers easily come to mind as non-marketed goods.

6.2 Overall Economic Benefits of Projects

Yields of most crops in Ghana are generally low and they are about 60% of research-proposed achievable yields across all crops grown. A major reason for the non-attainment of achievable yields is low adoption of improved technologies which includes the use of improved seeds by farmers. Several research papers both in Ghana and elsewhere have shown that there is a positive relationship between use of improved seeds and yield.

An increase in crop yield for farmers has very important economic implications on both the economy of Ghana and the household income of the rural farmer especially. Firstly, it is important to note that the crop sector in Ghana is the largest contributor to the agricultural GDP and its contribution is in excess of 50%. Secondly, an increase in crop yield will result in an increase in the percentage of crop output marketed by farmers resulting in an increase in their household income.

From the foregoing, inspiration from literature, and expert opinion, it is generally expected and estimated that the successful implementation of all the projects will on the average increase yield by about 15% for all crops under consideration. The presentation of the overall economic benefit is strongly based on this assumption as demonstrated in Table 1 and 2. Other assumptions and projections underlying the analysis include the following:

1. All proposed projects are successfully implemented.
2. The economic life of the project is 15 years.
3. A discount rate of 28% was employed (cost of government borrowing capital).
4. Output price is constant for all crops in the entire life of the project.
5. All other determinants of crop productivity and yield are held constant.
6. Project benefits begin at the end of the fifth year.

Table 25 below shows the actual crop output and value in USD for the production season of 2013 for the various crops under consideration obtained from FAOSTAT to help in the economic analysis.

Table 25: Crop Output and Value in USD for Year 2013

Crop Product	2013 Output/MT	2013 Actual Value/\$
Maize	1,949,897	680,810,000
Rice	481,134	197,000,000
Sorghum	279,983	114,930,000
Soybean	151,709.4	136,538,460
Cowpea	223,252.5	178,602,000

Source: FAOSTAT

Table 26 below shows the expected increase in value in USD of the various crops resulting from the estimated 15% increase in yield due to the holistic and successful implementation of all the projects. The table demonstrates that the projects will result in a total increase in value of all crops by USD \$196,182,000.00 annually. This amount is a very significant contribution to the agricultural Gross Domestic Product (GDP) and also significant in boosting the economy of Ghana.

Table 26: Projected Increase in Value in USD as a Result of 15% Increase in Crop Yield

Crop Product	Expected Output/MT	Expected Value/\$	(Δ in Value) Expected Value – 2013 Actual Value/\$
Maize	2,242,381.55	782,931,500	102,121,500.00
Rice	553,304.10	226,550,000	29,550,000.00
Sorghum	321,980.45	132,169,500	17,239,500.00
Soya bean	174,465.81	157,019,229	20,480,769.00

Cowpea	256,740.38	205,392,300	26,790,300.00
			TOTAL = \$196,182,000.00

Source: Author

Table 27 below demonstrates the calculation of the Net Present Value (NPV) and the Internal Rate of Return of the project; the results show an NPV of USD 217,108,445.75 and an IRR of 111.99%. A positive Net Present Value (NPV) of USD 217,108,445.75 means that the projects are collectively viable and therefore worthy of implementation. Also, the NPV could further be interpreted to mean that today's value of the added returns is USD 217,108,445.75 greater than the added costs. Another way of saying this is that the plan is expected to pay for itself and is worth an additional USD 217,108,445.75 in today's dollars.

Furthermore, a more than four times greater IRR of 111.99% compared to the cost of borrowing capital of 28% in Ghana demonstrates that the plan is very viable and worthy of implementation.

Table 27: Net Present Value (NPV) and Internal Rate of Return (IRR)

YRS	PROJECTED BENEFIT	INITIAL INVESTMENT	OPERATIOAL COST	NET BENEFIT	DF@28 %	PV
0		(8,249,000.00)	-	(8,249,000.00)	1.00000	(8,249,000.00)
1		(9,219,000.00)	-	(9,219,000.00)	0.78125	(7,202,343.75)
2		(8,785,000.00)	-	(8,785,000.00)	0.61035	(5,361,938.48)
3		(7,557,000.00)	-	(7,557,000.00)	0.47684	(3,603,458.40)
4		(7,178,000.00)	-	(7,178,000.00)	0.37253	(2,674,013.38)
5	196,182,000.00		(8,198,000.00)	187,984,000.00	0.29104	54,710,544.65
6	200,106,000.00		(9,018,000.00)	191,088,000.00	0.22737	43,448,380.89
7	204,108,000.00		(9,920,000.00)	194,188,000.00	0.17764	34,494,718.19
8	208,190,000.00		(10,912,000.00)	197,278,000.00	0.13878	27,377,822.23
9	212,354,000.00		(12,003,000.00)	200,351,000.00	0.10842	21,722,098.95
10	216,601,000.00		(13,203,000.00)	203,398,000.00	0.08470	17,228,480.74
11	220,933,000.00		(14,523,000.00)	206,410,000.00	0.06617	13,659,068.02

12	225,352,000.00		(15,975,000.00)	209,377,000.00	0.05170	10,824,537.19
13	229,859,000.00		(17,573,000.00)	212,286,000.00	0.04039	8,574,163.26
14	234,456,000.00		(19,330,000.00)	215,126,000.00	0.03155	6,788,179.64
15	239,145,000.00		(21,263,000.00)	217,882,000.00	0.02465	5,371,205.99
	NET PRESENT VALUE (NPV)					217,108,445.75
	INTERNAL RATE OF RETURN (IRR)					111.99%

Source: Author's Calculation

6.3 Auxiliary Project Benefits

6.3.1 Human Resource Development and Job Creation

The preliminary beneficiaries of the project will be the staff of the various institutions in the seed value chain who will be receiving further training in their respective fields. Trainings will be both in the short and long terms. It is the expectation of the plan that, nationwide, about five hundred (500) staff of the beneficiary institutions will receive further training. The target trainees include seed scientists, extension officers, private seed sector workers, staff of the universities, and farmers etc. The plan also contains plans to refurbish existing seed industry facilities and this will facilitate the work of researchers, technologists, and farmers. In terms of employment generation, the holistic implementation of the various projects is expected to generate about 2,000 additional direct jobs in Ghana.

6.3.2 Ease on Government Budget

Several of the projects in the plan are expected to be adopted by donor partners and development organizations for implementation. Additionally, it is expected that the private sector will develop to emerge as the central player in the development of the seed industry in Ghana. The involvement of the private sector, donor partners, and development organizations will help reduce the burden on government budget and Government can then channel the savings resulting from such assistance into the development of other sectors of the economy. The resurgence of the private sector also opens the way for the proper utilization of idle infrastructure under suitable public private partnership arrangements to ensure that infrastructure is used for the benefit of all players in the seed industry.

6.3.3 Knowledge Enhancement in the Seed Industry

The holistic implementation of the projects will lead to the enhancement of knowledge at all levels in the seed sector as well as other aspects of the agricultural sector in general. Specifically, the project for human resources development will lead to the skill training in specialized areas of the seed industry of a large number of young professionals in both internal and external learning centers. This

will enable them assume their specific roles in the management of the seed sector in Ghana. As well, a large number of technical staff, artisans, and farmers will gain advance knowledge in their areas of expertise, bringing them greater remuneration to their endeavours; they will further obtain maximum job satisfaction in any part of the seed sector they find themselves.

6.3.4 Increased Production of Improved Seeds in Ghana

The implementation of the plan will lead to increased production and use of certified seeds in Ghana laying a good basis for the achievement of national seed security which will support the attainment of overall food security and achievement of a modern agricultural development in Ghana. Further, the various projects under the plan will create awareness on the benefits of the use of certified seeds and enhance the Adoption Rate for improved varieties and Seed Replacement Rate (SRR) in Ghana which is crucial for enhancing the commercialization of the seed industry in Ghana.

Agriculture in Ghana is predominantly practiced in smallholder, family-operated farms, which produce about 80% of Ghana's total agricultural output. Currently in Ghana, about 2.74 million households operate a farm and these households are potential direct beneficiaries of the proposed projects when effectively implemented. It is estimated that about 80% of seed for next season planting comes from previous season's harvest and this negatively affects crop yield. It is generally expected however that, the holistic implementation of the projects will improve the adoption and use of certified seeds by farmers in Ghana, and drastically reduce the heavy dependence of farmers on seeds from previous season's harvested crop to about 50% on the average, for the scheduled crops of the seed industry. This has been accomplished in countries of East Africa and elsewhere and Ghana can achieve same.

6.4 Risk Analysis

The identified projects face a number of risks. Appropriate risk mitigating strategies must be adopted to reduce the impact of risks on the projects. The qualitative method of risk analysis has been adopted to identify and analyse risks as demonstrated in Table 29 below; (Table 29 further suggests appropriate mitigation strategies).

In ranking the risk events, three levels are attainable i.e. low, medium, and high level risks. The risk outcome as demonstrated in the Table 29 is obtained by multiplying the likelihood of the event occurring denoted by 'L' by the severity of the risk event, denoted by the letter 'S'. Both 'S' and 'L' have maximum values of 5 which means every risk event has a possible maximum outcome of 25. Every risk event with an outcome of less than 6 is considered to be low; events with outcomes greater

than 6 but less than 12 are considered to be medium risk. If the risk event however has an outcome of more than 12, the risk event is considered to be high and potentially a major threat to project success.

Table 28: Risk Analysis

ACTIVITY AT RISK	RISK EVENT	RISK CAUSE	IMPACT	RECOMMENDED MITIGATION STRATEGY	INITIAL RISK RATING			
					L (1-5)	S (1-5)	OUTCOME	RANK
Prompt disbursement of funds for project implementation	Lack of funding source because source is yet to be identified.	Prospective donors might prefer to sponsor certain aspects of the project that conforms with their perspectives	Delay in project Implementation resulting in the complementarity goal of the projects being defeated.	Government must exhibit a sense of ownership of neglected investment areas	4	4	16	High
Prevention of attrition among trained project staff	Trained project staff leaving project in search of greener pastures.	Poor remuneration and lack of motivation for project staff.	Delay in project implementation and extra cost on project resources in hiring and training new staff.	Staff salary strictly based on qualifications, experience and competence. Staff should be well motivated and incentivised.	4	4	16	High
Timely implementation of project.	Inadequate funding and Slow delivery of funds by sponsoring agencies.	Bureaucracy in the public processes as well as credit availability to implementing entities	Delay in project deliverables.	Project sponsors should commit to abiding to the financing plans approved for the projects. and	2	3	6	Medium
Proper Maintenance of project Property	Lack of maintenance of project property.	Non-existence of maintenance culture especially of property perceived to be owned by the state and others.	Unmet client service quality performance. Overall project purpose will be defeated.	Effective monitoring and evaluation unit of project should be set up, in collaboration with existing MOFA M&E processes to ensure adequate maintenance of project machinery and equipment.	5	5	25	High
Avoiding untimely shortage of funds	Excessive increments of project costs before it is completed.	Unstable monetary and fiscal policy in the country	Delay in project deliverables.	10% of Budget per annum may be added to project costs as contingency funds	5	5	25	High

Source:Author

6.5 Project Sustainability

Economic viability depends upon sustainability of project effects. It is important to ensure that the project benefits and outputs are sustainable since the seed industry of Ghana will occupy a critical part of the agricultural development process of the country. Efforts should therefore be made to create strategic linkages and partnerships among seed producers and research, extension and farmers as this is an important step towards sustainability of the industry. Furthermore, there should be a holistic approach to the implementation of the projects, respecting the need to ensure complementarity, balance and linkage.

Table 29: Sustainability Analysis

Sustainability Factor	Causal Activity
Financial	The project benefits that will accrue annually, as demonstrated under 5.2 will enhance the sustainability of the projects
	Adoption of the value chain approach in during implementation, whereby input suppliers, producers, inspectors, processors, marketers and end users are linked further enhances sustainability since the cooperation of the wide range of stakeholders would contribute to ensuring continuity in all the components.
Stakeholder/Private Sector	Initial private sector involvement and future leadership in the industry will promote the efficient and effective running of the industry. It will also promote investment in the seed industry by the private sector and enhance the sustainability of projects in the sector. Because the private sector operates on market incentives, private sector benefits have a greater likelihood of being sustained.
Stakeholder/Development Partners	The combination of government, its agencies, the private sector, development partners, donor community, and farmers acting together to address a critical national need provides a very credible basis for achieving sustainability in the project efforts.
Policy Environment	The government of Ghana recently adopted a national seed policy which gives direction for the implementation of the identified projects. The current institutional context of Ghana which includes the policy environment, social, economic and political structures also contribute to sustainability of the projects.
Trained Human Resource of DCS/MOFA	The Directorate of Crop Services (DCS) under the Ministry of Food and Agriculture (MOFA), which has seasoned agricultural specialists, some with wide experience in seed and agronomic matters, has the oversight responsibility of ensuring the success of the implementation of the National Seed Policy and National Seed Plan. Moreover, lead implementing agencies in all the identified projects are also the key concerned stakeholder agencies and direct beneficiaries who are therefore keen to ensure project viability and sustainability.
Consumers of Project Output	Farming is the livelihood of many Ghanaians especially the rural dwellers; farmers are the ultimate consumers of the project outputs. When issues hindering seed demand have been overcome, it is expected that the resultant escalation in seed demand, as the huge numbers of farmers procure more of their seed requirement on an annual basis, should lead to a profitable marketing base for the seed industry and hence make the projects sustainable.

6.6 Project Exit Strategies

6.6.1 Rationale

Exit strategies are useful in ensuring that when the allocated project support resources are no longer available, the activities can be maintained in the manner anticipated under the project plans. The record of Ghana's development effort is replete with a sad history of collapse of project activities when project assistance ends, and this sad prospect should be avoided for the seed plan.

6.6.2 Proposed Strategies

In the investment plans to be eventually developed from the project profiles of the seed plan, it is recommended that each proposal should have a carefully designed exit strategy while the detailed exit strategy for each project should be based on the collaborative efforts required of the key partners and on the intentional structures laid out for the purpose.

The following overall considerations should be taken into account in designing the exit strategy proposals:

- Activities to be involved in the exit strategy should be incorporated in the project design.
- A continuity plan should be put in place for all the key activities stressing, on roles to be carried out by each implementing partner/collaborator
- A defined continuing budget must be recommended to be put in place, with timing elements added and sources of funding defined.
- Individual partners/collaborators must budget for activities they would be carrying out and fund them through from their normal sources of funds such as GOG, IGF's, District Assemblies,
- Search for continuity funds from Government and new donors to carry out activities that must continue to be carried out
- Formation of Public/Private Partnerships (PPP)
- Where possible, selected viable and cost-effective aspects of a project can be teased out for continuing operation, after exhaustive considerations.
- Outright sale out could be made to private entrepreneurs to continue with specific activities

7.0 SUMMARY OF PROJECT PROFILES

Table 30: Summary of Project Profiles

Project Profile	Project Duration	Budget Allocation (\$)	Implementing Agencies	
			Lead	Support
Direct Private Sector Interventions				
Strengthening the Role of the Private Sector in the Ghana Seed Industry	5 years	2,541,000.00	Private Seed Sector	DCS, PPRSD & Extension, CSIR-CRI & SARI, and GLDB
Developing the Private Seed Sector Marketing	5 years	4,939,000.00	Private Seed Companies	Research Institutes, GLDB, GSID, DAES, DCS, Seed Growers, and Seed Retailers
Assisting the Private Seed Sector with Improved Infrastructure	5 years	8,144,000.00	DCS	Private Seed Sector, PPRSD, CSIR-CRI & SARI, GLDB and District Assemblies
Supportive Services for Seed Industry Growth				
A Strong Seed Value Chain for a Vibrant Seed Industry	5 years	5,958,000.00	DCS/CSIR-CRI	CSIR-CRI, CSIR-SARI, GLDB, GSID, Private Seed Sector, DAES, and DCS
Ensuring Adequate Human Resources for the Seed Industry	5 years	3,062,000.00	DCS/NSIA	Research Agencies, GSID, Private Sector Companies, GLDB, DAES, DCS, Seed Growers, Seed Retailers.
Strengthening the Plant Genetic Resources Base of the Seed Industry	5 years	902,000.00	PGRRI	CSIR-CRI, GLDB, DCS, PPRSD, Private Sector, and Farmers
Addressing the Gaps in the Strategic Components of the Seed Sector				
Catering for the Seed Needs of Traditional Crops	5 years	6,232,000.00	DCS	DAES, GAIDA, CRI, NSIA CRI, SARI, GLDB, DAES, PPRSD, GSID, and PGRRI
National Seed Security Project	5 years	3,402,000.00	GLDB/DSC	DAES, GAIDA, CRI, NSIA
Strengthening the Informal Seed Sector of Ghana	5 years	4,495,000.00	DCS	NGOs, FBOs, DAES, MOFA Directorate of Crops Services, GLDB, CRI, SARI, Private seed sector
Seed Sector Governance and Coordination				
Strengthening the National Seed Council Secretariat	5 years	1,312,000.00	NSC, MOFA, DSC	All Actors

8.0 RESOURCE MOBILIZATION

The health of the seed sector is necessarily the prime concern of Government. Therefore, Government is required to serve as the main and sustainable funding source for the national concern. In all respects, judicious provisions should be made from the national coffers to meet Government's responsibilities in

the seed chain. When the necessary processes have been followed, such as have been recommended in the Implementation Guidelines of the National Seed Policy, priority should be accorded to seed sector investments undertaken by Government.

However, due to challenges facing budgetary allocations in the face competing demands from other development needs, Government may have to request assistance from its development partners, who have in the past displayed a good record of support for Ghana's seed sector development and currently continue their support under various development schemes. Recognizing that there are, currently, multiple donor initiatives that benefit the seed sector, opportunity should be taken to ensure incorporation of the key portions of this plan into the activities of the on-going and future donor interventions. At the onset of the seed plan implementation, a joint audit should be conducted to enable MOFA and donor experts define more precisely the extent of donor project coverage of the projects in the seed plan and then to identify gaps and make recommendations on addressing the latter. Just as examples, the on-going AGRA-STTP and IFDC-ATT under USAID sponsorship and the upcoming ISSD Africa initiatives hold great prospects for projects relating to private seed sector development, seed quality assurance, marketing and the informal seed sector. The full list of currently active development partners is shown in **Annex 2**

It should be noted that resources from development partners are only a small part of the equation that can provide the necessary impetus to increased seed sector performance. More important is the political will and institutional awareness to do things differently. More money, in this respect, is secondary to providing the right incentives, accountability structure and overall sector coordination.

9.0 MONITORING AND EVALUATION

Projects will be designed to have strong M & E components to ensure that, on a case by case basis, objective and timely monitoring and evaluation of all seed plan activities are conducted. As far as possible, the M&E process will be expected to form part of the overall M&E processes of the National Seed Council which are required to be urgently developed. In that regard, a small but well-resourced unit with responsibility for M&E of seed development activities in Ghana will be incorporated into the secretariat of the National Seed Council, as proposed in Project: Strengthening National Seed Council Secretariat. Maximum use will be made of external expertise contributed by development partners in order to benefit from external perspectives and skills.

Annex 1: Technical Committee for the Preparation of the National Seed Plan

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International Seed Consultant Team Leader

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Annex 2: Ghana Seed Industry Partners

PROFILES OF PARTICIPATING AGENCIES AND STAKEHOLDERS

Partner	Current Contact	
	Email	Telephone
POLICY, OVERSIGHT AND COORDINATION		
<p>The Ministry of Food and Agriculture (MOFA) MOFA is responsible for the initiation of policies, and guides the orderly growth and development of the national seed programme. Furthermore, MOFA contains various oversight, control and coordinating agencies which will have responsibility for translating the policy statements into specific activities and outputs. The key agencies are as follows: krobeasant@gmail.com</p>	<p>(website: www.mofa.gov.gh info@mofa.gov.gh</p>	0302 666567
<p>a) The Plant Protection and Regulatory Service Directorate (PPRSD): PPRSD has responsibility for all plant protection and quarantine issues and through the GSID for overall quality assurance of the seed industry.</p>	<p>pprsdghana@gmail.com mkyofaboamah@yahoo.co.uk</p>	0302 990404
<p>b) The Directorate of Agricultural Extension Services (DAES): DAES has responsibility for seed extension and promotion activities as well as assistance in the informal sector interventions.</p>	<p>kamezah@hotmail.com</p>	
<p>c) Directorate of Crop Services (DCS): DCS has responsibility for coordination and facilitation of interventions in the crop subsector including technical services on improved planting material enhancement and productivity through adoption of appropriate technologies.</p>	<p>krobeasant@gmail.com</p>	0302 665506
<p>d) Policy, Planning, Monitoring & Evaluation Directorate (PPMED): PPMED has responsibility for monitoring and evaluation of the seed policy and plan and the programmes and projects that will result from them as well as assisting the NSC to undertake the process of periodic review of the National Seed Policy and assess the impact of programmes emanating from it.</p>	<p>mecppmed@gmail.com info@mofa.gov.gh</p>	0302 668157 0302 666567
<p>e) National Seed Council (NSC): National Seed Council, it has been reactivated from the former National Seed Committee and charged to ensure overall coordination and development of the seed industry.</p>	<p>krobeasant@gmail.com</p>	0302 665506
<p>f) National Variety Release and Registration Committee(NVRRC): The National Varietal Release and Registration Committee (NVRRC) has been established as a sub-committee under the National Seed Council to undertake the release of new crop varieties and also to delete obsolete varieties from the Variety List according to laid down procedures approved by the NSC.</p>	<p>mkyofaboamah@yahoo.co.uk</p>	0302 990404
<p>g) National Seed Service: The National Seed Service (NSS) was created to provide leadership and technical support for the development of the seed industry and to foster the development of private seed enterprises, small and medium</p>		

<p>seed producers/sellers and dealers. The NSS has not developed as expected and is presently almost non-operational and its mandate largely assumed by other public agencies. As per the provisions in this policy, MOFA will now support an association of private seed companies to set up a National Seed Industry Association to pursue the seed development goals previously entrusted to the National Seed Service (NSS).</p>		
2.0 PLANT GENETIC RESOURCES, CROP RESEARCH AND VARIETY DEVELOPMENT		
<p>2.1 The Plant Genetic Resources Research Institute of CSIR (PGRRI) PGRRI does not undertake any plant breeding activities. Its main function is to serve as a germplasm bank for breeders to access materials for selection, evaluation and crossing. It is also responsible for characterization of all germplasm in its gene bank. However the capacity for PGRRI to perform its core functions is very limited. Molecular characterization at PGRRI is very challenging because the laboratories are poorly equipped and basic reagents difficult to acquire. Most of the breeding institutions do not collect germplasm from PGRRI but rather prefer to receive materials from CGIAR institutes. The breeders in other CSIR institutes claim most of PGRRI's local collections lack variation/characteristics they need as they are mainly land races. On the other hand breeders from external organizations frequently request for materials from the PGRRI. Requests are also received from universities, mainly for work in connection with graduate student research.</p>	<p>info@pgrri.csir.org.gh aboagvelawrencemisa@yahoo.com</p>	<p>0277 766955</p>
<p>2.2 Agricultural Research Institutes</p> <p>The major institutions having mandate and capacity to undertake plant breeding in cereals, legumes, roots and tubers, and vegetables in Ghana are: CSIR-Crops Research Institute (CRI) CSIR-Savanna Agriculture Research Institute (SARI) University of Ghana (UG) University of Development Studies (UDS) Kwame Nkrumah University of Science and Technology (KNUST) University of Cape Coast (UCC) Ghana Atomic Energy Commission's Biotechnology and Nuclear Agriculture Research Institute (BNARI)</p> <p>However, active plant breeding for the above listed crop types has been more or less restricted to CRI, SARI and the three public Universities (UG, KNUST and UCC) over the past 10 years. CRI has been the pioneer plant breeding institution with activities spanning the past 40 years and more. SARI was part of CRI until it became a fully-fledged institute in 1994. The breeding activities of SARI have concentrated on traditional savanna crops (grain legumes, rice, sorghum, millet, yams).</p> <p>Breeding activities at KNUST are closely linked to teaching and learning at the Crop Science Department. The high proportion of resources allocated to root and tubers may be attributed to the Root and Tuber Improvement Programme (RTIP) which supported KNUST to develop new varieties from 1998-2004.</p> <p>The University of Ghana's capacity to undertake research in plant breeding has recently been enhanced by the award of a project support grant by the Alliance for a Green Revolution in Africa (AGRA) to train breeders. Under this programme, UG and Cornell University have jointly established the West Africa Centre for Crop Improvement</p>	<p>www.csir.org.gh headoffice@csir.org.gh www.knust.edu.gh www.uds.edu.gh www.ug.edu.gh www.ucc.edu.gh</p>	<p>0302-777651-4 03220-60100 03720-22078 0302-500381 03321-32709/33921</p>

<p>(WACCI). WACCI is to train 40 plant breeders with PhDs over a period of 10 years. About a quarter of the students are selected from Ghana with the remaining being selected from other West African countries.</p> <p>The University of Cape Coast has been involved in multiplication/testing of cassava accessions made up of mainly local land races. Two cassava varieties were released by the University in 2005. Also some cowpea segregating populations were generated through irradiation.</p> <p>The Ghana Atomic Energy Commission established the Biotechnology and Nuclear Energy Institute (BNARI) to promote food security using biotechnology and nuclear techniques as tools. BNARI pioneered tissue culture propagation especially for pineapple and plantain. The institute has had very qualified staff over the years. However financial resources to undertake crop improvement have been very limited. Breeding activities for rice, maize, cassava and vegetables are insignificant.</p>		
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3.0 SEED PRODUCTION AND MARKETING

<p>3.1 Grains and Legumes Development Board (GLDB) GLDB was established to undertake the production of foundation seed of cereal and legume crops from breeder seed obtained from the research institutes and the universities. GLDB is also responsible for the production and maintenance of primary planting materials for the vegetatively-propagated crops such as cassava, yam, plantain, sweet potato and citrus. GLDB is also responsible for the custom processing and storage of certified seeds produced by the private seed sector in custom-built processing plants across the country. The Board also manages the National Seed Security Stocks.</p>	<p>asuboah@hotmail.com</p>	<p>0208 17910</p>
<p>3.2 Private Seed Producers Private seed producers are registered seed growers either as self-contained units or contracted to grow seed for seed outlets. They are loosely held together by an umbrella body called Seed Producers Association of Ghana, (SEEDPAG). As the main conduit for certified seed supply their contribution in terms of certified seed production has been very modest so far.</p>	<p>yonifah@yahoo.com</p>	<p>0208 714626</p>
<p>3.3 Seed Outlets Seed outlets are made up mainly of private sellers of farm inputs who have come together as Ghana Agro Input Dealers Association (GAIDA)</p>	<p>gaidasecretariat@yahoo.com amarteybts@yahoo.com</p>	<p>0244 880417</p>
<p>3.4 Directorate of Agricultural Extension Services The Directorate of Agricultural Extension Services, MOFA is the main agency responsible for the promotion of use of quality seed alongside other agricultural technologies. This is done through training of its staff and farmers, field days, demonstration farms, and the development and dissemination of extension materials.</p>	<p>kamezah@hotmail.com</p>	

4.0 SEED QUALITY ASSURANCE

<p>4.1 The Ghana Seed Inspection Division The GSID was established within the Plant Protection and Regulatory</p>	<p>bequaye18@yahoo.co.uk</p>	<p>0244 066655</p>
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<p>Services Directorate of the Ministry of Food and Agriculture. It provides technical support for the development of internal and external quality assurance systems. It is located at Pokuase, a suburb of Accra, where it operates a National Seed Testing Laboratory. Satellite laboratories are sited in five strategic regional locations in the country. From the foundation stage up to the sale of certified seed, standards are enforced through seed regulations operated by the GSID. Seed growers engaged in the production of foundation, registered, and certified seed have to apply to the GSID for approval to commence production. Following approval, certification processes, including field inspections and laboratory seed testing, are undertaken by GSID. The legal basis for the enforcement work of the GSID is the recently passed Plants and Fertilizer Act, 2010 (ACT 803). GSID also monitors seed sales outlets to ensure suitability of storage premises, seed viability and purity.</p>		
<p>5.0 PRIVATE SECTOR DEVELOPMENT</p>		
<p>5.1 AGRA Sponsored Seed Production Units AGRA sponsored units are budding seed enterprises which are being assisted under an AGRA seed enterprise support programme. Their progress has so far been modest but they have established the potential for private sector development which can be further built upon (info-Accra@agra-alliance.org).</p>	<p>info-Accra@agra-alliance.org</p>	<p>030 277 2861</p>
<p>6.0 DONORS/DEVELOPMENT PARTNERS</p>		
<p>a) The United States Agency for International Development, USAID: In support of Government’s initiatives to achieve food security, USAID has consistently supported the Seed Industry under various programmes from its early beginnings. It advocated for and eventually provided support to the privatization of the seed industry in 1990. Over the years, USAID has assisted the seed programme with equipment supply, vehicles and training of Ghanaian counterparts in short and long term courses in Seed Technology at the Mississippi State University, in the United States. It provided start-up funds for the implementation of the private sector seed industry project which started in 1990. Operational vehicles were provided by USAID under projects named Agricultural Productivity Promotion Program and PL480 respectively. The National Seed Laboratory was also constructed with funds under APPP, (and eventually furnished with funds from the World Bank under the Agricultural Sector Rehabilitation Project) (contact: 0302-741-200). Presently a USAID sponsored IFDC-operated project ATTP is conducting a wide range of seed development activities including support to privatization and overall policy development.</p>	<p>skonlan@usaid.gov bconklin@usaid.gov</p>	<p>0544314056</p>
<p>b) CIDA: In 1979 the GoG sought the assistance of the Canadian Government and on the basis of a bilateral agreement the Ghana Grains Development Project, funded by Canadian International Development Agency (CIDA), was established. The purpose of the project was to develop and diffuse improved technologies for maize and grain legumes. The project was headquartered at the Crops Research Institute, Kumasi with CIMMYT as an executing partner, with GLDB and MOFA as ancillary partners. Between 1979 and 1997, the project trained and built the capacity of several scientists and technicians</p>	<p>info@acdi-cida.gc.ca</p>	<p>030 277 2861</p>

<p>from the CRI, GLDB and MOFA through long (post graduate) and short courses. The project also promoted the organization of an integrated national strategy for technology generation, testing and diffusion that involved the participation of several institutions. A strong linkage between farmers, researchers and extension was established which made on- farm trials easier. This led to the development and release of many new crop varieties of maize, cowpea, and groundnuts. The project produced breeder seed of all the released varieties emanating from research.</p> <p>Within the period of the project life it had developed several open pollinated maize varieties including the Quality Protein Maize (QPM) and its hybrids (www.psu-ghana.org).</p> <p>c) The Sasakawa Global 2000 Project: From its initial objective of strengthening the Extension Services of MOFA to promote the adoption of underutilized released crop varieties, the SG2000 expanded its program to cover research, seed production, extension, processing, capacity building, and equipment supplies.</p> <p>The Sasakawa Global 2000 has contributed significantly to the development of the Ghana Seed Industry since its inception in 1990. Its activities covered training and capacity building, seed promotion, study tours, equipment supplies and a credit facility to seed growers and dealers. It also supported the CRI with maize research and varietal development.</p> <p>Its major contribution to research has been the funding of the programme on open pollinated Quality Protein Maize (QPM) variety named Obatampa and the accompanying hybrids MAMABA, DADABA and CIDABA respectively. A quality control laboratory of international reputation was funded at the CRI to test the tryptophan and lysine levels of the QPM seeds. After the release of the Quality Protein Maize varieties, the SG2000 initiated a research project into the effects of feeding children on QPM with normal maize as the control.</p> <p>On the seed production front, quality control and certification activities, field days, seed promotion activities, planning and review workshops, training of seed growers and dealers undertaken by the GSID, were funded by the SG2000.</p> <p>Under the Sasakawa Funds for Education (SAFE) program, technical staff of the DAES, were supported to pursue under- graduate and graduate studies in various universities.</p>		
<p>d) German Agency for Technical Cooperation (GTZ): The GTZ (now GIZ) supported the seed and fertilizer industries in Ghana under the Ghanaian/German Agricultural Development Project, a bilateral Ghana/Germany cooperation programme. Between the years 1970-1990, the seed sector in the northern sector was supported with technical counterpart staff from Germany, in-country and outside country training of Ghanaian counterparts, seed conditioning and laboratory equipment, storage facilities and vehicles. Under the same program, research activities of the Savanna Agricultural Institute were supported through training of staff, equipment and funds to conduct</p>	<p>giz-ghana@giz.de info@giz.de</p>	<p>030 277 7375</p>

<p>research. This resulted in the release of maize, rice, sorghum groundnut, and cassava and soybean varieties primarily for use in the northern parts of Ghana.</p> <p>Under the West African Seed Development Project (1996-2002), a series of programmes were planned to enhance seed production and marketing in Ghana and the West African sub region. The project concentrated on cereals, legumes and vegetative propagated materials, such as cassava, yams and sweet potato. Training workshops were organized on seed production, marketing, quality control, seed production planning including development of business plans. Prototype seed processing equipment with dryers were installed at the CRI to demonstrate to farmers, seed growers and dealers, the importance of drying seed to a safe moisture level for longer storage periods. The project encouraged networking of the seed sector in the sub-region by introducing a monthly newspaper on latest developments in the seed sector in West Africa.</p>		
<p>e) International Centre for Fertilizer and Agricultural Development (IFDC):</p> <p>The International Centre for Fertilizer and Agricultural Development has since 2001 assisted the seed industry, especially towards the development of the private sector. An Action Plan for Developing Agricultural Input Market in Ghana was developed through a collaboration with MOFA, Environmental Protection Agency (EPA), SG2000 and USAID. A programme entitled Ghana Agricultural Input Markets (GAIMs) was also implemented with the support of USAID. It was a project designed to train and develop the capacity of seed producers and dealers in marketing.</p> <p>IFDC, in cooperation with a wide range of donor partners, sponsored workshops, both regionally for West Africa and nationally, aimed at enhancing the regulatory framework for seed production as well as seed marketing. Current IFDC support includes assistance to seed grower and dealer organizations under the Ghana Agro-dealer Development Project (GADD), Ghana Agro Input Network (GAINS) and Marketing Inputs Regionally Plus (MIR Plus).</p>	<p>ifdcghana@ifdc.org</p>	<p>0302-780830 / 0302-780829</p>
<p>f) International Fund for Agricultural Development (IFAD): IFAD is the main sponsor of the Root and Tuber Improvement and Marketing Programme (RTIMP), (formerly RTIP) in collaboration with CRI, SARI and PPRSD in MOFA. The project is developing, producing and certifying improved planting materials of cassava, sweet potatoes, and yams for distribution to farmers. Several cassava varieties most of which originate from International Institute for Tropical Agriculture (IITA), have been developed and distributed to farmers. Field Inspection and Quality Control Standards and protocols were developed with the support of RTIMP and field inspection teams were formed to ensure compliance with certification requirements. The field inspection role is now transferred to GSID. RTIMP also facilitates production of quality products, marketing and distribution.</p>	<p>u.demirag@ifad.org</p>	<p>0302 610945</p>
<p>g) Alliance for a Green Revolution in Africa (AGRA):</p> <p>A continental programme funded by the Bill and Melinda Gates foundation, chaired by Kofi Annan, the former General Secretary of</p>	<p>info-Accra@agra-alliance.org</p>	<p>0244 727213</p>

<p>the UN, to boost agricultural production and ensure food security in Africa. The programme is designed to build capacities of the human resource base of African countries to engender technology generation and dissemination in agriculture. Through the West Africa Centre for Crop Improvement, AGRA is training agricultural scientists in plant breeding and seed technology to take up the challenge of breeding and release of suitable varieties for the various ecological zones. It has supported the private sector with credit to improve the seed delivery system. This has been complemented with training and capacity building of seed entities.</p>		
<p>h) Food and Agriculture Organization (FAO): Lead agency in seed sector expertise, FAO has provided continuing assistance to the development of the seed programme in Ghana from the early days. Several technical cooperation projects and other activities have contributed to both software and hardware of the national seed programme, including the National Seed Policy.</p>	<p>www.fao.org</p>	<p>0302 010930</p>

Annex 3: Partners Sponsoring the Preparation of the National Seed Plan

MOFA

AGRA-SSTP

IFDC-ATTP

Annex 4: Current Seed Initiatives in Ghana and their Extent of Contribution to Proposed Seed Plan Projects

Name of program	Program period	Donor(s)	Anticipated Budget (\$m)	Extent of Contribution to Seed Sector Activities	Key partners in Ghana	Geographical focus	Crops and varieties focus	Intervention focus	Related Seed Plan Project and Extent of Contribution from the current Activities	Target groups
Program for Africa's Seed Systems (AGRA-PASS)	2007 & on-going	BMGF	14.5	Fully	SARI, CRI, University of Ghana, KNUST, IFDC, private sector (seed companies, agro-input dealers)	National	Maize Rice, Cowpea, Soybean, Groundnuts, Cassava, Vegetables Improved varieties	Crop improvement ; education and training, seed production and support to agro-dealers development	<i>Project:</i> "Ensuring adequate human resources for the seed industry" <i>Extent:</i> Significant	Small-holders and rural poor farmers, private seed companies, researchers
Feed the Future (FtF) Agriculture Technology Transfer Project	2013-2017	USAID	22	Substantial	IFDC, SARI, GABBIC, CDI Wageningen UR, ISU, private sectors	Northern Ghana	Maize, Rice & Soybean Improved varieties	Seed production; Integrated soil-fertility management and technologies promotion and research	<i>Project:</i> "A strong seed value chain for a strong seed industry" <i>Extent:</i> Significant <i>Project:</i> "Assisting the private seed sector with improved infrastructure" <i>Extent:</i> Substantial	Commercial farmers, seed companies, researchers
West Africa Seed Program (WASP)	2012-2017	USAID	12	Fully	CORAF/WE CARD, ECOWAS, AGRA, CGIAR, AFSTA, Regional universities,	National	Maize, Rice, Sorghum Improved	Building alliance for seed Industry in West Africa; national and regional seed laws and regulations implementation & harmonization;	<i>Project:</i> " Strengthening the role of the private sector in the Ghana seed industry" <i>Extent:</i> Substantial	Commercial farmers, seed companies and their associations, regulatory bodies

					Private seed companies		varieties	seed production; private sector participation and national seed trade associations strengthening	<i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Substantial	
West Africa Agriculture Productivity Program (WAAPP)	2012-2018	World Bank	66	Substantial	MOFA, CSIR, SARI, private sectors	National	Cassava, Yam, Sweet potato Improved varieties	Regional cooperation in registration, release, dissemination and trade of technology at the ECOWAS level, information system development; national centre of specialization and competitive agriculture research grant mechanism	<i>Project:</i> “Catering for the seed needs of traditional crops” <i>Extent:</i> Significant <i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Substantial	Small holder farmers, private processors,
Scaling Seeds and Technologies Partnership (SSTP) (in over 6 countries)	2013-2016	AGRA, USAID	47	Fully	IFPRI, MOFA, CARD	Southern Ghana	Maize, Rice, Soybean, Cassava, Cowpea, Sorghum Improved varieties	Improved technologies demonstration and dissemination, increase role of private seed sector, improve public sector regulatory functions and farmers training	<i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Substantial	Smallholder farmers
Yam improvement for Income and Food Security in West Africa	2011-2016	BMGF	12	Marginally	IITA, NRI, CRI, SARI, CRS	Ashanti and Northern region	Yam Local and improved varieties	Increase yield through disease and pest free yam seeds development; and market sector	<i>Project:</i> “Catering for the seed needs of traditional crops” <i>Extent:</i> Substantial	Smallholder farmers

(YIISWA)								strengthening		
Sweet Potato Action for Security and Health in Africa (SASHA)	2009-2014	BMGF			CIP, CRI, CRS	Ashanti, Brong-Ahafo, Eastern, Central, Volta, Upper East	Sweet potato Improved varieties	Develop of virus resistance, drought tolerant and improved vitamin A content new varieties; dissemination of disease-free planting materials; and distribution system	<i>Project:</i> Catering for the seed needs of traditional crops <i>Extent:</i> Substantial	Smallholder farmers with emphasis on women farmers
Seeds Systems project in West and Central Africa	2011-2013	AusAID			SARI, CRI	Ashanti, Northern regions	Cowpea, Groundnuts	Analysis of the key constraints and opportunities in the seed system; identify appropriate conditions for optimal productivity of important cereal and legume crop varieties; encourage establishment of cost-effective seed supply channels and capacity building	<i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Minimal	Smallholder farmers
Seed Policy Action Node	2013-2015	AGRA	0.43	Fully	PPRSD,	Nationwide	All crops	Seed policy, promote adoption of improved high-yielding crop varieties, Seed regulatory enforcement, capacity for	<i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Minimal	Executives, Legislators, Judiciary, Researches, Extension, Seed Producers, Seed Companies, Seed

								Ghana.		Associations, Regulators, Farmers, NGOs, Development Partners, Financial Institutions
Improving Ghana's Sustainable Value Chains for Exports	2012-2015	UNIDO	3.696	Marginally	PPRSD	Nationwide	Fruits, Cocoa	To improve national seed quality system through accredited laboratory service delivery	<i>Project:</i> "A strong seed value chain for a strong seed industry" <i>Extent:</i> Minimal	Seed Producers, Seed Importers, Seed Exporters, Farmers, Researchers
Direct Support to SARI	TBD 2013- TBD 2018	USAID	5.5	Substantial	SARI	SADA North	Maize, Rice, Soya	Build the physical and human capacity of SARI to strategically manage a growing number of research partners and initiatives, lobby and advocate for funding, conduct cutting edge agricultural research that responds to farmer/market demands, and effectively disseminate those research products to large populations.	<i>Project:</i> "Ensuring adequate human resources for the seed industry" <i>Extent:</i> Substantial <i>Project:</i> "A strong seed value chain for a strong seed industry" <i>Extent:</i> Minimal	SARI researchers, particularly in maize, rice and soya

Program for Biosafety Systems (PBS)	2012-2017	USAID	1.25	Marginally	IFPRI	National	Biotech crops	To provide key stakeholders adequate information to make evidence-based decisions regarding biotechnology products	<i>Project:</i> “Strengthening the role of the private sector in the Ghana seed industry <i>Extent:</i> Minimal	Policy makers, regulators, researchers, and consumers
Direct Support to the University of Ghana, Legon	TBD 2014- TBD 2019	USAID	2.9	Substantial	University of Ghana, Legon	N/A	N/A	Provide support to UG, Legon to improve its capacity to provide excellent agricultural education to students from Ghana and the region	<i>Project:</i> “Ensuring adequate human resources for the seed industry <i>Extent:</i> Substantial	Administrators, professors, researchers, and students
TCP/GHA/340 1: Assistance to the Crop Services Directorate of the Ministry of Food and Agriculture in the Formulation of the Ghana National Seed Policy	2013	FAO	0.07	Fully	DCS	National	All Crops	To provide assistance to the Directorate of Crop Services to facilitate the formulation and completion of a National Seed Policy	<i>Project:</i> “A strong seed value chain for a strong seed industry <i>Extent:</i> Significant	Stakeholders along the value chain
Dispatch of the technical cooperation expert in plant breeding (rice) to the West Africa Centre for Crop Improvement	2010-2014	JICA	0.5407	Substantial	University of Ghana College of Agric and Consumer Sciences	N/A	Rice Seed	To strengthen the research capacity on rice breeding	<i>Project:</i> “Ensuring adequate human resources for the seed industry <i>Extent:</i> Substantial	Students in WACCI, University of Ghana

(WACCI), University of Ghana										
Root and Tuber Improvement and Marketing Program (RTIMP)	2006- 2014	IFAD and Governm ent of Ghana (GoG)	27.7	Substantial	MOFA, CRI, SARI, private sectors	Througho ut Ghana (over 90 districts)	Cassava, Yam, Sweet potato Improved varieties	Enhance income, food security and improve livelihoods; competitive market-based commodity chain development; upgrading of small-scale root & tubers processing, business and marketing skills	<i>Project:</i> “Catering for the seed needs of traditional crops <i>Extent:</i> Significant <i>Project:</i> “Developing the private sector seed marketing <i>Extent:</i> Substantial	Rural poor farmers, small scale processors
Youth in Agriculture (YIAP)	2009 onwards	GoG			MOFA, Seed producers and companies	Througho ut Ghana	Maize, Sorghum, Soybean, Tomato, Onion Improved varieties	Youth motivation into farming/food production as a commercial venture; subsidized seed, fertilizers’, tractor and other services such as credit, to the members organized in block- farms, output marketing (buffer stock) company of MOFA or directly to customers		Youth farmers
Ghana Commercial Agriculture Project (GCAP)	2012- 2017	World bank	145	Marginally	MOFA, SADA	SADA region of north, Accra plains	Maize, Rice, Horticul ture (butternut, squash)	Improve private sector led investment for agricultural development through PPP arrangements, nucleus and out- growers scheme,	<i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Minimal	Small holder farmers

							Improved varieties	irrigation, agri-business support		
Ghana – Agricultural Development and Value Chain Enhancement (ADVANCE)-second phase	2013 onwards	USAID	4	Marginally	ACDI/VOCA, MOFA, Private sectors	North Ghana	Maize, Rice, Soybean Improved varieties	Markets, finance, inputs and equipment services and information; builds the capacity of smallholder farmers to increase the efficiency of their farm business with improved production and post-harvest handling practices that include improved seed varieties and access to quality inputs, mechanization services and market access.	<i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Minimal <i>Project:</i> “Developing the private sector seed marketing” <i>Extent:</i> Minimal	Smallholder and commercial farmers, medium and large-scale agro-processors
Northern Rural Growth Project (NRGP)	2009-2014	ADF, IFAD, GoG	62	Marginally	MOFA	Northern region (32 districts)	Maize, Rice, Soybean, Groundnuts, butternut, squash	Commodity chain development including improved varieties and seed promotion, rural infrastructure development and access to financial Services	<i>Project:</i> “A strong seed value chain for a strong seed industry” <i>Extent:</i> Minimal	Men, women and youth farmers
Rice Sector Support Project	??	AFD	15.46	Marginally	MOFA	Northern, Upper	Rice	Support to the rice value chain	<i>Project:</i> “A strong seed value chain for a strong	Rice producers,

(RSSP)		France				East, Upper West, and northern parts of the Volta Region	Improved varieties	development through land development, access to credit, capacity building; support to rice inter-professional body and applied research	seed industry” <i>Extent: Minimal</i>	processors and traders
Inland Valley Rice Development Project (IVRDP)	?	AFDB, GoG	0.805	Marginally	MOFA, CRI	Ashanti, Brong Ahafo, Central, Eastern and Western Region (21 districts)	Rice Improved varieties	Land development; access to credit; support machineries; support to farmer based seed groups; grain producers and traders; farmers field school; adaptive research and capacity building	<i>Project: “A strong seed value chain for a strong seed industry”</i> <i>Extent: Minimal</i> <i>Project: “Assisting the private seed sector with improved infrastructure”</i> <i>Extent: Minimal</i>	Smallholder rice producers, traders and processors
Sustainable Development of Rain-fed Lowland Rice Production Project (Rain-fed lowland rice project)	2009-2014	Japanese technical cooperation		Marginally	MOFA	Northern and Ashanti Regions	Rice Improved varieties	Development and dissemination of the model for sustainable rain-fed lowland rice production, improve farming system and capacity building	<i>Project: “A strong seed value chain for a strong seed industry”</i> <i>Extent: Minimal</i>	Rice producers
SEED PRODUCTION (4 Grants)	2011-2014	AGRA	0.90	Fully	SEEDPAG, Farmers	Ashanti, Volta, Brong Ahafo, Upper west,	Maize, Rice, sorghum, soybean, cowpea and tomato	Increase improved and disease resistant cassava cuttings (seed), increase productivity and distribute certified improved maize, sorghum, soybean, cowpea and tomato	<i>Project: “Catering for the seed needs of traditional crops”</i> <i>Extent: Minimal</i> <i>Project: “A strong seed value chain for a strong</i>	Lexbok Investments, Mabert Company Limited, Agri Commercial Services Limited, Josma Agro-

								seeds for poverty reduction	seed industry” <i>Extent: Minimal</i>	Industry Ltd
CROP IMPROVEMENT (5 Grants)	2010-2014	AGRA	0.94	Substantial	CSIR – CRI(2), SARI	National	Rice, cowpea, Soybean & Cassava	Improve yield, quality and adaptability of upland and rain fed lowland rice varieties, improved soybean varieties adapted, evaluate and disseminate improved cowpea, Validate and disseminate improved Cassava landraces	<i>Project: “A strong seed value chain for a strong seed industry”</i> <i>Extent: Minimal</i> <i>Project: “Catering for the seed needs of traditional crops”</i> <i>Extent: Minimal</i>	Breeders, Seedpag, Farmers
BREADBASKET (3 Grants)- Northern Region Breadbasket Coordination (BB), Agricultural Value Chain Mentorship Project (AVCPM), Integrated agricultural productivity improvement and marketing project (INTAPIMP)	2012-2015		4.52	Marginally	International Fertilizer Development Center SARI GAABIC	Northern Region	Maize, soybean, cowpea, Rice	Assisting FBOs, smallholder farmers, agro-dealers and small and medium enterprises (SMEs) to improve their entrepreneurial	<i>Project: “Developing the private sector seed marketing”</i> <i>Extent: Minimal</i> <i>Project: “A strong seed value chain for a strong seed industry”</i> <i>Extent: Minimal</i>	MoFA, NGO's, FBO's, Farmers etc.
Government Assistance										

Ghana Grains and Legumes Development Board	N/A	GoG	N/A	Fully	Research, Private Sector	National	All Crops	Foundation Seed production of all crops, Agro-processing services, management of National seed security stock	<p><i>Project:</i> “A strong seed value chain for a strong seed industry”</p> <p><i>Extent:</i> Significant</p> <p><i>Project:</i> “Building resilience for the Ghana seed systems”</p> <p><i>Extent:</i> Significant</p> <p><i>Project:</i> “Catering for the seed needs of traditional crop”</p> <p><i>Extent:</i> Significant</p> <p><i>Project:</i> “Assisting the private seed sector with improved infrastructure”</p> <p><i>Extent:</i> Significant</p>	Certified Seed Producers
Plant Protection and Regulatory Services Directorate	N/A	GoG	N/A	Substantial	Private Sector Stakeholders	National	All Crops	<p>Registration of Seed Growers,</p> <p>Certification of Breeder, Foundation and Certified Seeds and also Primary and Secondary planting materials,</p> <p>Registration of Seed Dealers, Monitoring of Seed Dealers’</p>	<p><i>Project:</i> “A strong seed value chain for a strong seed industry”</p> <p><i>Extent:</i> Significant</p> <p><i>Project:</i> “Assisting the private seed sector with improved infrastructure”</p> <p><i>Extent:</i> Significant</p>	Producers, Processors, Importers and Exporters

								outlets Seed importers and exporters Registration of importers, Monitoring of importers' outlets, Registration of exporters Monitoring of exporters' outlets, Sensitise stakeholders on the seed law and regulations	<i>Project:</i> "Strengthening the role of the private sector in the Ghana seed industry" <i>Extent:</i> Significant	
Directorate of Crop Services	N/A	GoG	N/A	Substantial	All stakeholders	National	All Crops	National Seed Policy and plan implementation, Harmonization of the Regional Policy Documents, Facilitate and Chair the Release of Improved Varieties by the National variety Release and Registration Committee, seed pricing ,seed/planting materials production Sensitization, Build capacity of seed sector stakeholders Identify, update and disseminate	<i>Project:</i> "A strong seed value chain for a strong seed industry" <i>Extent:</i> Significant <i>Project:</i> "Building resilience for the Ghana seed systems" <i>Extent:</i> Significant <i>Project:</i> "Catering for the seed needs of traditional crops" <i>Extent:</i> Significant	Breeders, Private sector stakeholders, farmers

								existing improved crop varieties, cataloguing of released varieties		
Research Institutes and Universities	N/A	GoG	N/A	Substantial	All stakeholders	National	All Crops	Coordinate research and development, Ensure quality and excellence in teaching, entrepreneurship training, research and extension of knowledge, collect, characterize, evaluate, conserve, maintain, document, distribute and utilize germplasms of all crops	<i>Project:</i> “A strong seed value chain for a strong seed industry <i>Extent:</i> Significant <i>Project:</i> “Building resilience for the Ghana seed systems <i>Extent:</i> Significant <i>Project:</i> “Catering for the seed needs of traditional crops <i>Extent:</i> Significant <i>Project:</i> “Strengthening the plant genetic resources base of the seed industry <i>Extent:</i> Significant	Researchers, Students, Private sector
Key:	Fully: Seed Sector Development is the primary objective									
	Substantially: There is a substantial contribution to the seed sector									
	Marginally: Some seed sector activities are included, but the sector is not the primary objective									