

Seed System Development Strategy

VISION, SYSTEMIC CHALLENGES, AND PRIORITIZED INTERVENTIONS

(Shortened from the mother document, finalized in 2013)



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The Federal Democratic Republic of Ethiopia
Ministry of Agriculture

Ethiopian  ATA
Agricultural Transformation Agency
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List of acronyms

AGP	Agricultural Growth Program
ASE	Amhara Regional Seed Enterprise
ATA	Agricultural Transformation Agency
BH	Bako Hybrid
BMGF	Bill and Melinda Gates Foundation
BoA	Regional Bureau of Agriculture
CSA	Central Statistical Agency
DA	Development Agent
EIAR	Ethiopian Institute for Agricultural Research
EPA	Environmental Protection Agency
ESA	Ethiopian Standards Agency
ESE	Ethiopian Seed Enterprise
ESGPA	Ethiopian Seed Growers and Processors Association
ETB	Ethiopian Birr
FTC	Farmer Training Center
GOE	Government of Ethiopia
GTP	Growth and Transformation Plan
HLI	Higher Learning Institute
IBC	Institute for Biodiversity Conservation
IV	Improved variety
MoA	Ministry of Agriculture
MLE	Monitoring, Learning and Evaluation
NARS	National Agricultural Research System
NGO	Non-Governmental Organization
NSIA	National Seed Industry Agency
NVRC	National Variety Release Committee
OPV	Open pollinated variety
OSE	Oromia Regional Seed Enterprise
PSE	Public seed enterprise
QC	Quality control
QDS	Quality declared seed
QPM	Quality Protein Maize
RARI	Regional Agricultural Research Institute
RSE	Regional seed enterprise
SNNP	Southern Nations, Nationalities and Peoples Region
SPV	Self-pollinated variety
SSE	South Regional Seed Enterprise

Acknowledgments

It is with the support and contribution of many partners that this vision and strategy document was developed for the Ethiopian seed system. ATA would like to express its sincere appreciation for the data, insights and guidance of its partner organizations from public, private and NGOs sectors, at Federal, Regional and International levels. ATA looks forward to continued collaboration towards the transformation of the seed system and the agricultural sector as a whole.

Federal

Ministry of Agriculture, Directorate of Input Marketing
Ministry of Agriculture, Directorate of Animal and Plant Health Regulatory Services (APHRS)

Ethiopian Institute for Agricultural Research (EIAR)

Ethiopian Seed Enterprise (ESE)

National Seed Planning Committee

Federal Cooperative Agency (FCA)

Regional

Amhara Regional Bureau of Agriculture

Amhara Regional Agricultural Research Institute (ARARI)

Amhara Regional Seed Enterprise (ASE)

Oromia Regional Bureau of Agriculture

Oromia Agricultural Research Institute (OARI)

Oromia Regional Seed Enterprise (OSE)

Somali Regional Bureau of Agriculture

SNNP Regional Bureau of Agriculture

Southern Agricultural Research Institute (SARI)

South Seed Enterprise (SSE)

Tigray Regional Bureau of Agriculture

Private Sector

Ethiopian Seed Growers and Processors Association

Pioneer Hi-Bred Ethiopia

Alemayehu Makonnen/Seed Co.

Anno Agro-Industry

Avallo Seed Company

Hadia Seed Company

International

Alliance for Green Revolution in Africa (AGRA)

International Wheat and Maize Improvement Center (CIMMYT)

International Food Policy Research Institute (IFPRI)

International Center for Agricultural Research Dry Areas (ICARDA)

International Potato Center (CIP)

Seed Trade Association of Kenya (STAK)

The Bill and Melinda Gates Foundation (BMGF)

The Royal Netherlands Embassy

The United States Agency for International Development (USAID)

Executive Summary

For smallholder farmers, investing in varieties of improved seeds and modern inputs is a critical step towards increasing yields, and as a result, improving livelihoods. As demonstrated in many research papers and relevant country case studies, increasing the utilization of seeds of improved varieties, when accompanied with other agricultural inputs and appropriate agronomic practices, can dramatically increase Ethiopia's annual crop production. Recent studies suggest that adopting improved varieties in an additional quarter of the current crop area could increase production of maize by **over 60%** and self-pollinated crops by **over 30%** in these areas. This would result in a total production increase of more than 7 million tons per year.¹

Most farmers in Ethiopia have very limited access to high quality, improved seed in convenient outlets, and many released varieties of different crops with superior traits have not still been widely disseminated. Some of the specific challenges associated with seed include the limited capacity and lack of role clarity of the different actors, the focus of the system on very few crops and varieties, mismatch between supply and demand resulting in shortage and excess inventory, and quality issues due to inappropriate production, storage, and transport practices.

An additional area of complexity is the fact that formal seed production still has a limited footprint in Ethiopia, covering under 6% of the total land area. Like many developing nations, the Ethiopian seed system is highly dominated by the informal sector, along with an emerging intermediate sector consisting of community based seed producers.³

The vision and mission for Ethiopia's Seed System is:

OVERALL FIVE-YEAR VISION for Ethiopia's Seed System

An innovative market-led multi-sector seed system that effectively contributes to improvement of farmers' livelihood

OVERALL FIVE-YEAR MISSION for Ethiopia's Seed System

A well-functioning seed system that enables all farmers, women, men, and youth, to access seed of improved varieties at the right quality, quantity, time, and price, from a range of producers and distribution channels in order to increase production and productivity

There are several underpinning factors that are critical to enabling this vision:

- The effective development, release, and registration of high-quality varieties.
- Clearly delineated roles of public and private producers in the formal sector:-
- A vibrant market environment that enables both public and private producers to produce, market, and distribute seed effectively through multiple channels
- Regulatory structures that ensure quality at all stages of the seed system..

¹ Dercon S. et al., 2009

³ **Note:** See Section 4.2 "Defining the intermediate sector", for clarifications on specific groups that are included in the intermediate sector (starting on page 70). For clarification, larger farmer entrepreneurs are classified in the Formal Sector as they have to register in order to produce and distribute seed.

- Robust intermediate sector to effectively support community-based producers that decentralizes seed production and distribution while maintaining effectiveness. .
- Maximizing the potential of the informal sector (farmer-based seed production).

The final success of this strategy depends on appropriate ownership, coordination, and accountability by relevant partners at all levels. Over 30 systemic bottlenecks across the different areas of the seeds system have been identified, which will be addressed by a respective set of interventions.

Recognizing this fact, the GOE has identified the seed system as a priority area of focus. So far, continued efforts by concerned stakeholders have made considerable progress in developing the country's seed system. Such efforts could, however, be further enhanced and coordinated to significantly contribute to the overall transformation of the agricultural sector.

Chapter 1. Introduction

1.1 Purpose and scope of this strategy document

This document seeks to outline Ethiopia's national strategy to transform the seed system in a comprehensive manner. It is intended to guide domestic and international partners in targeting their investments and efforts towards addressing systemic bottlenecks with the objective of bringing about holistic transformation. This is a living document and will be refined and updated as the system and its needs evolve in the coming years.

To achieve this task, It is worked directly with national and local stakeholders to:

- Identify the primary **bottlenecks** to smallholders' success in each step of the value chain;
- Design a set of comprehensive, actionable **interventions** addressing these issues;
- Propose a series of key **activities** and recommended owners to successfully carry out the strategy.

This document does not include implementation timetables, budgets, or resourcing assessment for the proposed interventions, which will be designed by the implementing stakeholders. As such, it is intended to serve as the blueprint for the seed sector, enabling stakeholders to coordinate their activities to be harmonious and comprehensive.

1.2 Strategy development approach

All bottlenecks have been identified through

- *Review and synthesis* of existing diagnostic and strategy materials on the sector
- *Systematic interviews* with all stakeholders,
- *Primary data collection is done on the seed value components*⁴. Next, interventions were designed to address these groups of bottlenecks guided by the following:
 - ✓ *Historical experience* in Ethiopia of successful and unsuccessful projects in the sector;
 - ✓ *International best practices* that can be tailored to the Ethiopian context
 - ✓ *Consultations with experts*, using problem-solving sessions

⁴ This document is indebted to the Central Statistics Agency, the UN FAO, as well as numerous development and implementation partners who have collected systematic production, sales, climate, resource, livelihood, and outcomes data. A full list of data sources consulted and interviews conducted can be found in Appendix B.

This document goes further to suggest activities that should be owned by stakeholders in the sector, proposing a prioritization scheme for the first five years. The following sources have been used while developing and identifying the vision, bottlenecks and interventions outlined in this document:

- ✓ Extensive review of the relevant literature on international seed systems -
- ✓ In-depth key informant interviews and discussions with local stakeholders
- ✓ Case studies of the Ethiopian seed system-
- ✓ International case studies on the seed sector of other countries-

Some of the key stakeholders who have been deeply involved in the process of crafting this sector strategy are listed under acknowledgement part of this document.

1.3. The seed system and its components

The seed system refers to the full set of activities and stakeholders involved in effectively developing, producing, and distributing seed to smallholder farmers. Currently, the seed system in Ethiopia can be classified into two broad sectors – **the formal and the informal sectors**. This strategy document also identified the **intermediate sector**, which has distinct yet overlapping features with the already recognized sectors. As noted earlier, the major actors in this newly defined sector are community based seed production systems. The major rationale for the recognition of the intermediate sector includes the following:

- To focus activities that identify and effectively address systemic challenges of entities of the subsector
- To strengthen a more decentralized seed production and dissemination system..

The diagrams and tables below depict both the current and envisioned seed system, and how all the different components link together.

Exhibit 2

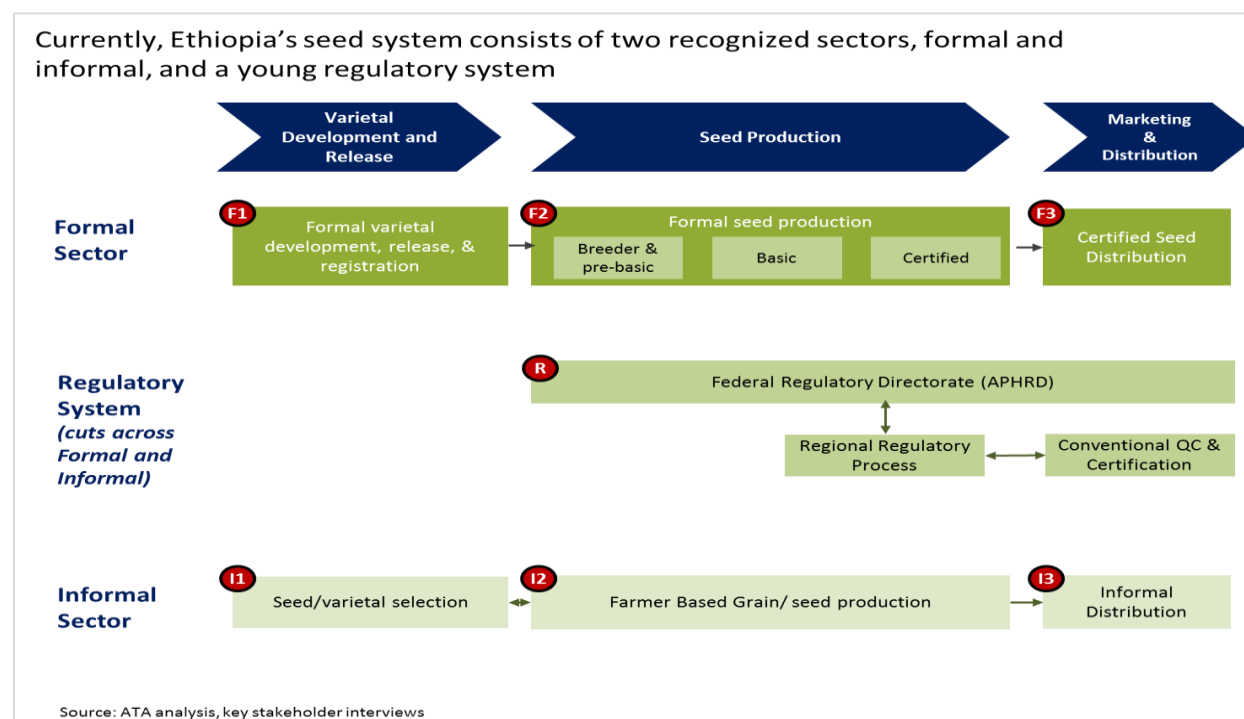
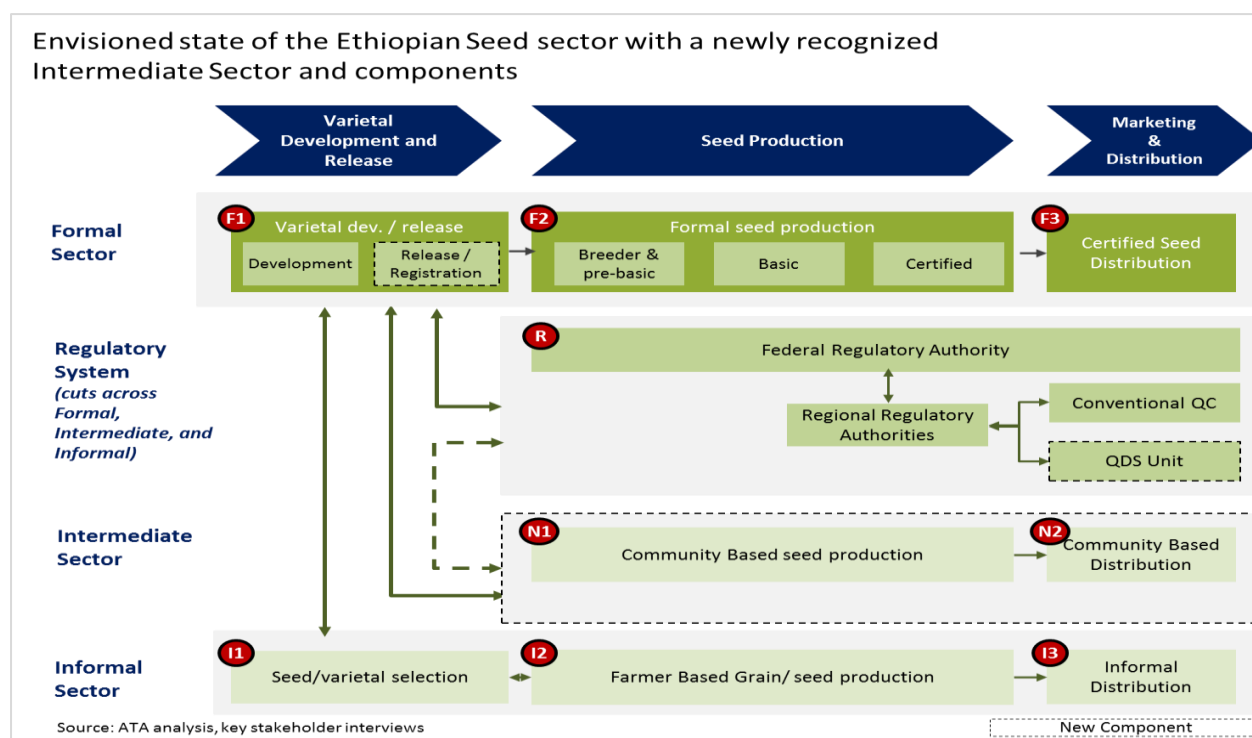


Exhibit 3



1.4. Recent Developments in the Ethiopian Seed System

In the last 5-10 years, the Ethiopian seed system has seen a surge in production volumes of certified seed. Over the last decade, certified seed production has increased over five-fold⁶. However, this growth has come at the expense of quality, which has significantly deteriorated while the production volumes have increased. This is a result of a number of developments across all the steps of the value chain.

The use of improved varieties in Ethiopia is very low by sub-Saharan Africa standards. In the 2006-07 season, adoption of certified seed for hybrid maize was only 19% of the total area, and this was the crop with the widest adoption. For other crop types such as wheat, tef, barley and sorghum, adoption rates were even lower.

Availability to improved varieties has the potential to significantly improve smallholder productivity. However, in order to be truly effective, the production of certified seeds needs to match farmers' demand for specific varieties.

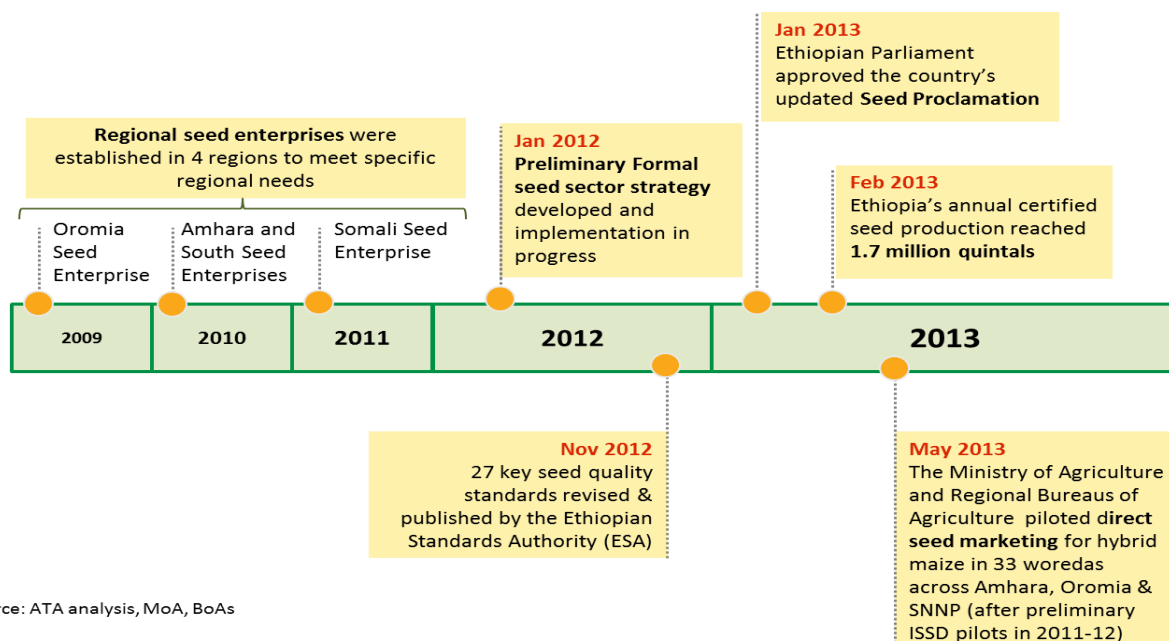
Farmers' willingness showed growth to invest in and adopt certified seeds. This is a result of large-scale popularization and awareness campaigns conducted by GOs and NGOs. In response, more seed producers have emerged and increased seed supply significantly.

⁶ Data from public seed enterprises and the MoA's National Seed Coordination Unit

Major achievements in the Ethiopian seed system are as outlined below.

Exhibit 4

There have been a number of achievements in Ethiopia's seed sector over the last 5 years, including the establishment of 4 Regional seed enterprises in 4 regions, as well as a new seed proclamation



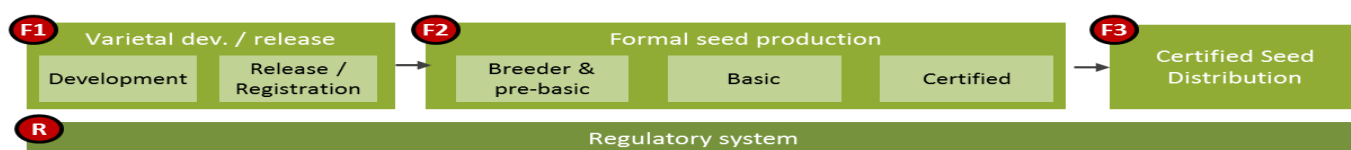
Source: ATA analysis, MoA, BoAs

Chapter 2: Formal seed sector

2.1 Key components, overall framework, and objective for the formal sector

The formal sector is composed of three major elements, namely 1) varietal development and release, 2) seed production, and 3) seed marketing and distribution. Within each of these elements is a set of components.

Exhibit 7



The objective of the formal sector is;

A dynamic, efficient and well regulated formal sector that provides farmers with sufficient, affordable, timely and high quality certified seeds of improved varieties for key crops through multiple production and distribution channels while maintaining the genetic biodiversity of the country.

Component F1: Varietal development, release, and registration

The goal for varietal development is a system that develops and maintains the varieties that meet smallholder farmers' needs, providing early generation seeds to all licensed public and private sector seed companies that meet clear regulatory standards. To enable this, three bottlenecks and their respective interventions have been identified.

Bottlenecks and interventions for Varietal Development in the Formal Sector				
	Bottlenecks		Interventions	Owners
F1.1	Lack of resources in public research system to effectively develop improved varieties and produce breeder seed	F1.1a	Strengthen breeding capacity of National Agricultural Research Institutions	EIAR/NARC
		F1.1b	Strengthen the financial viability of the public research system	EIAR/NARC
F1.2	Lack of clear communication, role clarity, and accountability among various research institutions and units	F1.2	Establish a clear link between federal and regional research institutes to ensure coordination and avoid duplication of efforts	EIAR/NARC
F1.3	Limited commercialization and adoption of improved varieties by seed producers and farmers	F1.3a	Develop contractual agreements and effective pricing / marketing mechanisms between research and extension and seed producers	EIAR/NARC
		F1.3b	Ensure variety development incorporates traits beyond simply yield	
		F1.3c	Research institutions and producers should work to actively popularize new improved varieties to drive adoption	
F1.4	Lack of capacity of maintainer institutions results in risk of poor quality	F1.4	Ensure high capacity for maintainers of each improved variety through designated maintenance breeders and sufficient nucleus seed	EIAR/NARC
Bottlenecks and interventions for Varietal Release and Registration in the Formal Sector				
	Bottlenecks		Interventions	Owners
F1.5	Current varietal release system is not independent from varietal development	F1.5a	Establish an autonomous regulatory entity at the federal level that will also be responsible for conducting varietal evaluation, release, registration, and PVP (Plant Variety Protection)	MoA Regulatory Directorate
		F1.5b	Develop new and amend existing variety release and registration guidelines detailing steps and processes of varietal evaluation, release and registration	MoA Regulatory Directorate
F1.6	Current varietal release and registration process has severe capacity constraints	F1.6	Build capacity of the variety evaluation, release, and registry authority	MoA Regulatory Directorate
F1.7	Post-release duties and rights of the variety owners are not enforced due to capacity	F1.7	Complete revision of Plant Breeders' Rights Proclamation and draft regulations for immediate	MoA Regulatory Directorate

Background and History of Varietal Development

In Ethiopia, the history of varietal development dates back to the 1950s. However, a more systematic varietal development activity, which involved multi-location trials, was started after the establishment of the Institute of Agricultural Research (IAR) in 1966⁸ (renamed EIAR). After few decades, the varietal development process was progressively decentralized to regions.

Currently, the majority of improved varieties are developed by the public agricultural research system (EIAR, RARIs and HLIs). The NARS also works closely with CGIAR and CIMMYT to access germ plasm, build capacity and address broader systemic challenges. In addition, a handful of international seed companies such as Pioneer and Seed Co. have begun to import, adapt, and register varieties from other countries, but these varieties still are evaluated by experts that represent public research institutions.

Bottleneck F1.1: Lack of resources in public research system to effectively develop improved varieties and produce breeder seed.

The public research system faces several capacity constraints - both in terms of researcher retention, as well as the necessary finances, lab equipment, land access, farm management machinery and staff.

Intervention F1.1a: Strengthen breeding capacity of National Agricultural Research Institutions: Equipping plant-breeding research with technological advances such as biotechnology should be emphasized, to efficiently tackle the daunting challenge of increasing agricultural productivity. While managing the controversy around GMO technologies, Priority will be given to application of *in vitro* propagation & diagnostics, Marker Assisted Selection (MAS) for selection of superior traits and doubled haploid. To fully realize such benefits, HR development will get prior attention.

Intervention F1.1b: Strengthen the financial viability of the public research system: Effective contractual relationships between the research institutes and seed producers will be strengthen to ensure financial viability on top of legalizing licenses or royalty payments. Utmost care should be taken to ensure that public research agenda doesn't shift to commercially attractive crops, while abandoning the crops that are less viable financially..

Bottleneck F1.2: Lack of clear communication, role clarity, and accountability among various research institutions and units:

Coordination and governance of variety development in public research is a critical area of improvement. Research units in EIAR, RARIs and HLIs are not well coordinated that led to duplication of variety release, less adoption and poor resource utilization.

Intervention F1.2: Establish a clear link between federal and regional research institutes to ensure coordination and avoid duplication of efforts: The recent establishment of NARC begins to address this issue

⁸ Hailu (1991); Tesfaye and Jemal (1982)

of coordination. Specific components required to ensure variety development occurs effectively include: Clear designation of which centers are responsible for which activities, ideally by type of crop and applicability to agro-ecologies; Set of guidelines supported by a legal binding structure to enforce the responsibilities of regional and national research centers. Of course, there have been certain exceptions, such as a regionally-developed variety that has been discovered to have relevance to another region; thereby involving a sharing of germplasm among RARIs.

Bottleneck F1.3: Limited commercialization and adoption of improved varieties by seed producers and farmers:

In the past 10 years, EIAR has released a number of varieties. In spite of this, very few of these varieties are adopted and commercialized by seed enterprises. For example, 95% of hybrid maize seed production from public varieties is accounted for BH-660 and BH-540, which are released about twenty years ago.

There are several root causes for the lack of farmers' adoption of newly released varieties:

- 1) Weak involvement & linkage of the extension, research institutions and producers in popularization of public varieties.** Popularization of public varieties is generally left to public institutions, and the linkage between extension and research has traditionally been weak. Additionally, seed producers lack marketing plan to actively promote a public variety that is used equally with other producers.
- 2) Improved varieties are often not applicable to all agro-ecologies, especially low-rainfall areas, and also focus on specific crops.** The majority of improved varieties are developed for high-potential areas, with reliable rainfall. Of all the varieties released, only 11% of cereal varieties are adapted to low-rainfall areas (as of 2008). Additionally, improved varieties tend to focus on a small subset of crops, i.e., hybrid maize at the exclusion of cereal and pulse SPVs.
- 3) Improved varieties are not fully aligned with preferences of producers and farmers:-** In some cases, new improved varieties are not fully aligned with the factors that most strongly influence the decisions of seed producers and users. For example, the maize hybrid BHQP-542 was developed for its high protein content. However, it is a single-cross and yields lower than its lower-protein counterpart BH-540. Due to these drawbacks, seed producers have been reluctant to multiply the seed. As a result, there has been an increased focus on promoting varieties that have more competitive yields.

Intervention F1.3a: Develop contractual agreements and effective pricing / marketing mechanisms between research and extension and seed producers:- In order to ensure commercialization and adoption, there needs to be a clear and strong interaction model between research, extension and seed producers at the outset of the variety development process. This includes effectively identifying the target farmers and agro-ecologies, popularization of new varieties and production of those new varieties through contractual agreements.

Once the seed is certified, it is critical to have a sound and effective pricing/marketing mechanism that incentivizes seed producers to actively engage in the promotion of new varieties.

Intervention F1.3b: Ensure variety development incorporates traits beyond simply yield:- Yield has been often given priority in variety development, but it will be essential to consider other factors. Like protein content, oil content, resistance to pests/diseases and resource use efficiency. This will require a participatory research approach where researchers will be able to identify farmers' preference.



Intervention F1.3c: Research institutions and producers should popularize new varieties to drive adoption:- A stronger link between research, extension, and producers will be critical to ensure on ground popularization of new varieties. This could potentially entail joint demonstrations

Bottleneck F1.4: Lack of capacity of maintainer institutions results in risk of poor seed quality:-

For a variety to remain true-to-type, through multiple generations of multiplication, the research center that owns a variety is responsible for maintaining variety purity at breeder seed level. However, some important varieties are currently not maintained, although their maintaining institutes were registered in the national varietal register.ⁱⁱ This is due to lack of financial, equipment and human capacity.

Intervention F1.4: Strengthen capacity for designated variety maintainer research institutions: the maintaining institution should be provided the necessary resources and guidelines to keep reserve of nucleus seed for each of the released varieties. IBC and the research system should strengthen their relations to ensure presence of pure quality nucleus seed for each released variety. In addition, tracking of data on specific varieties is crucial, and a central database (ideally supported by ICT methods) that enables open access of varietal descriptors by relevant stakeholders is required. Moreover, there needs to be a clear varietal retirement plan based on performance data vs. availability of substitution varieties.

Background and History of Varietal Release and Registration

In Ethiopia, crop variety release activities were initially introduced and managed by the National Crop Improvement Conference (NCIC) that involved multiple stakeholders. In 1982, the activity was taken over by the National Variety Release Committee (NVRC). The establishment of the National Seed Industry Agency (NSIA) in 1993 marked the beginning of organized seed production and certification system in Ethiopia.

The Agency took over the responsibility of variety release and registration while most of the other activities like technical evaluation of candidate varieties and verification trials remained under the management of ad-hoc committees. Nevertheless, until the enforcement of the first Ethiopian Seed Law (206/2000) there was no legal footing for the various activities of the NVRC. In 2004, when the responsibilities and duties of the Agency were officially transferred to the MoA, the variety release was taken over by the Crop Production Department. Currently, the Variety Release, Protection, and Seed Quality Control Directorate (VRPSQCD) of the Ministry of Agriculture (MoA) coordinate various activities related to Variety Release. In addition the country acknowledges plant breeders' rights through the PVP law (Proc. 481/2006), though the law has not yet been applied and thus there is no a single protected variety so far. This is because DUS activities have not yet been operationalized.

Variety release and registration guidelines for field crops and horticultural crops have been in use since 1994 and 1998 respectively. Currently, a standing National Variety Release Committee and various technical committees drawn from different institutions undertake variety release and evaluation. In 1997, the first crop variety register was produced and has been updated every year. Crop varieties released through NVRC have been automatically registered by the secretariat of the committee (coordinating office) without any additional tests or decision. Limited variety morphology and other relevant agronomic data available were included as part of the registry. However, the information in the registers is not sufficient and lacks standardized data to identify the variety.

Ethiopia is joining Common Market for Eastern and Southern Africa (COMESA) and requesting the World Trade Organization (WTO) where the country should abide by the Trade Related Aspects of Intellectual

Property Rights (TRIPS) agreement. The TRIPS agreement demands member countries to have some sort of Plant Variety Protection (PVP) in place. Besides being a WTO requirement, implementation of PVP will stimulate the private sector and international companies to introduce superior varieties into the system. Per the exhibit below, the development and release of varieties has been largely driven by the public sector.

Bottleneck F1.5: Current varietal release system is not fully independent from varietal development:

Though the MoA-VRPSQC is mandated to oversee and coordinate the evaluation of candidate varieties for release and registration, evaluation activities are conducted on the Public NARC research fields. According to key informant discussions with private company representatives and APHRD experts,¹¹ private companies had limited confidence in the collected data and results of evaluation submitted by researchers of the public system. This is specifically because the publicly developed varieties by NARC are in direct competition with the private candidate varieties and this creates a conflict of interest in the evaluation process. Moreover, researchers from public agricultural research institutes are often form the technical committee that is responsible for evaluating the performance of candidate varieties submitted for release.

Intervention F1.5a: Establish an autonomous regulatory entity at the federal level that will also be responsible for conducting varietal evaluation, release, registration and PVP (Plant Variety Protection): Though it is difficult to establish an autonomous institution only for these activities in the Ethiopian context, it is possible to have a relatively well-focused independent structure to administer the variety evaluation, release and registry system. The likely option would be to include variety release and registry as part of the regulatory structure that is proposed under the regulatory section of this document. This ensures autonomy and trust.

Intervention F1.5b: Develop new and amend existing variety release and registration guidelines:- One intervention in this regard is to revise the composition of the existing National Varietal Release Committee (NVRC). The purpose is to adequately represent relevant stakeholders of the seed industry, to create a conducive environment for both public and private researchers, to revise costs and timelines associated with variety registration, to incorporate international protocols and align to recent development and to set up incentives and accountability mechanisms to ensure NVRC members conduct timely evaluation and reporting.

Bottleneck F1.6: Current varietal release and registration process has severe capacity constraints:-

VRPSQCD lacks the required number of qualified staff, resulting in public NARS directly or indirectly conducting data collection, analysis, and report development. Furthermore, as the financial system of the department is under the MoA finance pool, there are many efficiency constraints that hinder the timely evaluation of candidate varieties.

Poor technical, financial and human resource capacity has been negatively affecting the DUS and VCU testing procedures essential for variety evaluation. Newly released varieties may not be better than existing older varieties and may not meet the right need of smallholder farmers. The major reason for the release of sub-optimal varieties includes:

¹¹ Interviews conducted with private company representatives and APHRD experts, 2012

- a. Evaluators and data sets: Evaluators do not conduct rigorous evaluation of candidate varieties against data sets.
- b. Lack of standardized DUS testing: Candidate varieties have not been tested for their DUS: resulted in a knowledge gap when identifying and differentiating varieties of the same crop species. This is contributing to unreliable field inspection, rejection of many seed fields, lower motivation of breeders, duplication of efforts in variety development and unwise resource utilization.

The release system also lacks evaluation of parents and inbred lines in the cases of hybrids. Under the current system, only F1 hybrids are eligible for evaluation, which denies the inclusion of parents in the verification. This poses serious problems in subsequent activities of seed multiplication and seed quality control. Both seed companies and seed quality control experts did not have the opportunity to determine the morphological and agronomic behaviors of the parents of the released hybrids.

Intervention F1.6: Build capacity of the variety evaluation, release and registry authority:-The new institution for variety evaluation, release and registry will require strategic investments to build its technical, infrastructural and financial capacity. Specifically:

- **Human resource development:** Conducting VCU and DUS testing procedures requires qualified experts, adequately trained and compensated at a level that encourages retention and attracts qualified experts.
- **Create finance and logistic unit within the Directorate:** The authority should be equipped with the required number of vehicles, finance and a specific unit that manage those issues to effectively conduct evaluation activities frequently and on time. Financial independence, e.g., control of spending decisions, is also critical to enable independent decision-making and ensure the timely release of funds.
- **Construct federally managed VCU and DUS testing stations:** to separate the variety development and release activities, the Directorate for variety release and registration in MOA should have its own VCU and DUS testing stations managed by its experts and delegated evaluation committees. To ensure such stations, representative locations will be identified and selected across agro ecologies. Involvement from all relevant parties, i.e., regional states, developmental partners, and the MoA will be critical to selecting and supporting the DUS sites with infrastructure, logistic and human resources.

Bottleneck F1.7: Post-release duties and rights of the variety owners are not enforced:-Despite the existence of PBR Law since 2006, provisions of this law have not been implemented yet. The proclamation has been amended, as some of the articles are outdated, and therefore failed to address current needs of the seed industry, particularly the commercialization of horticultural and floricultural crops. As a result the varieties released so far are dominated by the public research system.

The Variety Release Guideline and the Variety Protection Law (Proc. 481/2006) require the owners of new varieties to preserve nucleus seed at IBC. Unfortunately, only very few breeders met their obligation due to poor enforcement.

Intervention F1.7: Complete revision of Plant Breeders' Rights Proclamation and draft regulations: As mentioned earlier, the old Proclamation on plant breeders' rights is currently under revision. The revision process would consider most local and international developments. Among others, COMESA and WTO requirements will be part of the new proclamation. To support the implementation of the revised proclamation, regulations have to be drafted and endorsed.

Component F2: Seed production in the formal sector

Formal seed production should ideally consist of a set of diverse, qualified seed producers that produce adequate quantities of early generation and certified seed; and cater to the needs of farmers through timely delivery of sufficient volumes of high-quality seed that meets national standards. To this end, a set of six bottlenecks and respective interventions have been identified.

Bottlenecks and interventions for Seed Production in the Formal Sector				
	Bottlenecks		Interventions	Owners
F2.1	Seed producers lack capacity for internal quality control	F2.1a	Provide guidelines/standards to enforce internal quality control for all seed producers	MoA/RBoA Regulatory
		F2.1b	Enable seed producers to build capacity for internal quality control	RBoA/ESE/RSEs/Private sector
F2.2	Seed production volume does not satisfy farmers' demand	F2.2	Strengthen national seed demand estimation and local market assessment	MoA/RBoAs/ESE / RSEs/Private sector
		<i>Intervention F2.6 is also relevant to this bottleneck</i>		
F2.3	Limited availability of early generation seed	F2.3	Increase capacity of breeding institutions to produce higher quantities (linked to Intervention 1.1a)	EIAR/RARIs
F2.4	Lack of market environment reduces incentives to maximize quality and quantity	F2.4a	Delineate and enforce roles and responsibilities among seed producers	MoA/RBoAs
		F2.4b	Support private sector producers to meet needs for commercially attractive crops	MoA/RBoA
F2.5	Inefficient out-grower management by seed producers	F2.5	Develop effective out-grower management by seed producers	ESE/RSEs/Private Sector
F2.6a	Delayed seed processing and delivery by seed producers	F2.6a	Support seed producers with sufficient financing and land so that they can scale effectively to satisfy unmet demand	ESE/RSEs/Private Sector
F2.6b	Seed producers lack effective commercial (customer-facing) operations	F2.6b	Support seed producers to improve business planning, marketing, and operations management	ESE/RSEs/Private Sector

Background of Seed Production in Ethiopia

In Ethiopia, seed production is dominated by the public sector with a small yet growing role of the private sector. The private sector primarily focuses on hybrid crop varieties – and includes multinational companies (e.g., Pioneer, Seed Co), as well as smaller local companies. From the public companies, the Ethiopian Seed Enterprise (ESE) plays a dominant role, but the relatively young Regional Seed Enterprises (RSEs) are currently showing strong growth in terms of production volumes.

With the establishment of RSEs, certified seed production has increased over five-fold over the last 10 years, the volume of seed is even higher considering the recent growth of the private sector.

Specifically, the RSEs and ESE depend on out-growers for most of their seed production with poor seed recovery rates. ESE's estimates show that in the 2010/11 season, 65% of the seed produced on smallholders' plot was uncollected.¹⁴ In addition, the quantity improvements have not been matched by improvements in quality.

Bottlenecks and Interventions Focused on Quality Control (F2.1)

In addition to external quality control, internal quality control systems are necessary for all seed producers. The essential role of the internal quality control system is emphasized by the Ethiopian Seed Proclamation 782/2013, which states that all commercial seed producers need to establish internal quality control (IQC) systems.

Bottleneck F2.1: Seed producers lack capacity for internal quality control

On the capacity side, the rapid growth in seed production in recent years, led by the RSEs and their networks of out-growers, has not been accompanied by a commensurate investment on internal quality control systems.

In addition, many seed enterprises are found to lack infrastructural capacity in terms of farm machineries and implements, seed processing and storage facilities (cold rooms), seed testing labs and vehicles for transportation. Capacity gaps also include skilled staff such as plant breeders, seed technologists, pathologists, entomologists, and others.¹⁸ Significant capacity gaps were identified at all stages of the seed value chain in this regard:

- **Early Generation Seed:** Maintenance breeding is not adequately conducted as a result the quality of seed is deteriorating as production of generations increase.
- **Certified seed:** The problems in certified seed production are highly observed in cases where majority of production is done on out-growers schemes. The lack of internal quality control capacity of seed enterprises and poor knowledge level of out-growers is the primary reason for poor quality. These factors can be attributed to the irregularities in the issuance of competence certificate. Some producers obtained the certificate without having enough trained manpower and adequate facilities. Additionally, there is often inadequate subsequent follow-up from the regulatory bodies, and challenges related to the renewal of certificates.

Intervention F2.1a: Provide guidelines/standards to enforce internal quality control for all seed producers: Establishment of clear and comprehensive assurance/control standards and enforcement Directive for internal quality control is critical. Creating an internal quality control system can be included as mandatory criteria (with details on HR, seed labs and equipment) in an updated directive of a competency certificate issuance.

¹⁴ Dalberg (2011)

¹⁸ Benti T., 2011

Intervention F2.1b: Enable seed producers to build capacity for internal quality control (IQC): To effectively implement IQC, government should design a phase by phase capacity-building (HR, equipment laboratory) programs with seed enterprises as primary drivers. Seed producers, can follow the idea of sharing infrastructure, such as IQC laboratories, testing equipment, and others. For instance, the Ethiopian Seed Growers and Processors Association (ESGPA) can invest in a shared service that each producer commits a certain amount of investment to have a common seed lab that provides an internal IQC service.

Bottlenecks and Interventions Focused on Quantity (F2.2 to F2.3)

Bottleneck F2.2: Seed production volume does not match farmers' demand

Currently, there is a significant challenge in effectively forecasting and fulfilling farmers' demand, both in terms of variety and volume. This is driven by a few factors:

- **Forecasting methodology:** The government is employing a bottom-up demand-assessment, with input from woredas, development agents (DAs), and individual farmers about their seed needs. However, the process currently does not consider shifts in demand due to changes in rainfall pattern, farmer preferences, and the overall market need. Moreover, This target is loosely apportioned to the various producers (i.e., ESE and the RSEs). At the end of the cycle, the government through the Input Marketing Directorate allocates supply proportionally through the cooperatives based on the original demand or also overall crop area coverage for each region / woreda to ensure equity. However, shifts in demand due to changes in rainfall pattern and market situation are not considered.
- **Linkage with distributors:** Cooperatives and unions are the primary mode of distribution in many cases. Today, the demand assessment system does not have a direct link with cooperatives and unions. Seed producers have a very limited role in marketing and distribution – they do not know their customers and they do not have tangible, market intelligence data to plan next year's production.
- **Supply bottlenecks:** Even in cases where demand is correctly forecasted, there are often supply bottlenecks driven by climate uncertainty during seed production (e.g., droughts), lack of adequate infrastructure, land, and financing from the producer standpoint, and poor seed recovery from out-growers.
- **Allocation of cost and risks across actors in the system:** At present, regions are covering costs of variety popularization through extension systems, costs & risks of carryovers, non-paid seed credit taken by cooperative/unions and compensation to farmer due to poor quality seed.

Intervention F2.2: Strengthen national seed demand estimation and local market assessment:- In the short- and medium-term, gradual transition of demand assessment to seed producers and distributors should be done. Specifically, seed producers will directly bear the costs of carryover as well as the opportunity costs of not forecasting sufficient demand.

- **National demand estimation:** The government should lead a collaborative process with players across the seed value chain, to forecast demand on the basis of current market conditions.
- **Make demands available through a national platform:** The government could make data on seed demand and supply publically available through a national electronic data center or facility.

- **Adjust for supply shocks through emergency reserve strategy:** Beyond estimating national demand, the government should ensure preparedness for emergency situations through strategic seed reserve systems

Overall, this will require significant changes in current approaches. Specifically, local seed companies enter contracts with regional governments, and their contracts have pre-determined seed production targets, distribution quotas, and prices. By removing these distortionary strategies, seed producers and seed consumers can more effectively negotiate over the terms of exchange and assume responsibility for production and consumption.¹⁹

In the longer-term, the government could take a limited role in demand assessment, allocation, and pricing, as producers will bear more of this responsibility. Additionally, real-time market information should be clearly accessible and shared with government supports the facilitation. To reinforce this, extension should effectively work to check and confirm farmer demand on the ground. .

Bottleneck F2.3: Limited availability of early generation seed

Scarce quantities of early generation seed ultimately results in limited quantities of certified seed. To date, RSEs have done the multiplication of the limited quantities of pre-basic and basic hybrid maize seed that they produce on their own farm. But for crops such as wheat, the multiplication needs to be done on farmers' fields. In these scenarios, there was risk of contamination.²⁰

Intervention F2.3: Increase capacity of breeding institutions to produce higher EGS quantities: Certain specific actions need to be taken to increase the amount of breeder seed upon the release of a new variety, as this directly impacts how much and how quickly that variety can be multiplied and scaled. Areas of focus in capacity building include

- Identifying additional irrigation sites for researchers to conduct seed multiplication.
- Working on a contract basis with seed producer cooperatives (SPCs),
- Research institutions can set up arrangements with producers for additional plots and land be it through leasing, renting, or other means.
- Alignment of demand to amount of seed produced.
- Financing will also be required for research institutions, for example, advance payments can be distributed by producers to research institutions.

Bottleneck F2.4: Lack of market environment reduces incentives to maximize quality and quantity:

A competitive market will enable realization of both quantity and quality factors of seed. Unlike other countries, there are multiple challenges facing the domestic private sector entities in competing fairly with the public seed enterprises. In order to build a robust private sector several constraints must be understood and addressed: (i) the shortage of basic seed for private seed growers, (ii) government intervention in all commercial aspects of the value chain, (iii) poor business and regulatory support, and (iv) insufficient support and start-up funding for young seed companies.

¹⁹ Transforming Demand Assessment and Supply Responses in Ethiopia's Seed System and Market, Spielman and Mekonnen, 2012

²⁰ *ibid.*

Intervention F2.4a: Delineate and enforce roles and responsibilities among seed producers:- There is currently a working hypothesis for role sharing that has gained strong traction among public and private enterprises as they aim to fill various gaps and avoid overlap of responsibilities. The delineation can be designed in terms of Breeder, Pre-basic, basic, certified and QDS production across EIAR, RARIs, RSE, Seed Unions, privates and ESE. This can be enforced through MoU or guideline or directive while exercising a binding contract agreement.

Intervention F2.4b: Support private sector producers to meet needs for commercially attractive (low-volume and high margin) crops:- The private sector should be supported in fertile working policies, equitable access to inputs – including land, EGS, finance, provision for differentiated branding and pricing of seeds. The enabling environment that will be created by supportive policies is expected to increase the entry of new local seed businesses and enhance the capacity of existing ones while prioritizing development of domestic seed companies. The value of international seed companies in meeting Ethiopian farmers’ needs is best demonstrated in Pioneer Hi-Breed’s experience in Ethiopia for the past 20 years.

The entry of international companies should be done carefully to protect Ethiopia’s farmers against predatory and monopolistic practices and ensure that these companies have demonstrated business ethics and high quality products that are relevant for Ethiopia. Besides effect of crowding out the young domestic private sector seed companies should also be considered. One way to enable this is to have international seed companies focus more on high-value, low-volume varieties such as hybrid maize, including a joint venture approach.

Bottleneck F2.5: Inefficient out-grower management by seed producers

The seed companies in Ethiopia rely heavily on smallholder out-growers for seed production. This approach has enabled them to produce large amounts of seed soon after their establishment. ASE, for instance, produced more than 789,000 quintals of seed in its first year of operation.²¹ However, there are two challenges that RSEs face in depending heavily on smallholder out-growers.

- **Quality threats.** Working with smallholder out-growers requires effective management of quality. However, RSEs face severe capacity constraints given their young age.
- **Low retrieval rates of seed.** Another critical challenge that most PSEs, have faced is the low retrieval rates of seed from out-growers. The main constraint is lack of cash-flow management and timely availability of capital to pay farmers at the time of purchase, as agreed in the signed contracts. In addition, the price offered by PSEs to farmers (which is determined by an assessment of the market price with a 15 percent mark-up) was also deemed to be too low and farmers instead preferred to hold on the seed and sell it as grain or seed in the informal market later in the year.²²

Intervention F2.5: Develop effective out-grower management:- Seed producers can take several approaches to effectively manage out-growers. Domestic and international experience shows that this can be addressed through various approaches:

- **Clustering out-growers.** is grouping smallholder out-growers into clusters. This reduces management costs and increases out-grower accountability to quality and seed recovery.

²² Dalberg, ASE Strategy Refresh, 2011

²² Dalberg, ASE Strategy Refresh, 2011

- **Comprehensive tracking systems and databases.** This refers to have a tracking tool that ensures rewarding of reliable out-growers and discontinue working with unreliable ones. Seed producers in the country can collaborate and build a common out-growers database to ensure out-growers tracking.
- **Formal certification and registration of out-growers.** Refers to registration of out-growers based on set criteria and linking it to contract farming scheme.
- **Sufficient incentives for out-growers.** Seed producers need to revisit their incentive structure, and offer competitive premiums to out-growers.

Bottleneck F2.6a: Delayed seed processing and delivery by seed producers:

PSEs have a limited time windows (a maximum of 3 month) in which they can sell their seed. This makes it especially critical to prevent any delays in processing, which are driven by two primary factors:

- **Credit constraints for PSEs.** PSEs face cash shortages during seed harvest time, which requires them to secure loans. The delays to secure loans have an effect on timely seed acquisition from farmers.
- **Lack of adequate processing facilities and logistics:** creates additional delays. For example, in 2010-11 it was estimated that it took two to three months for all RSEs to process in rentals, whereas with their own machine it would have only taken them only one month. In addition, RSEs lack adequate capacity in terms of their own trucks that forced them for delay in seed distribution.

Bottleneck F2.6b: Seed producers lack effective commercial (customer-facing) operations:-

To date, seed producers (PSEs and private) have not undertaken any significant marketing or promotional activities to sell their seed and differentiate their brands. This is highly linked to their dependency syndrome on public extension system and ignoring the marketing principles that a seed company should follow.

Intervention F2.6a: Support seed producers with sufficient financing and land:- Producers currently require additional financing to make key capital investments, be it in land / plots for seed multiplication, cleaning / processing equipment, transportation, or agent/channel development. The government should play a role in linking producers to financial institutions as well as development organizations.

Intervention F2.6b: Support seed producers to improve business planning, marketing, and operations management:- Seed companies in Ethiopia need to develop Business/strategic plans. This will enable them to make an effective use of public sector support for highly demanded, recycling seeds \ and orphaned crop that are less commercially viable. Effective operations and investments are critical across all producers to ensure self-sustainable and independent seed companies in the country.

Component F3: Marketing and distribution in the formal sector

The goal of marketing and distribution is to set up a system that creates a market driven environment through multiple channels. There are market factors that indicate a robust marketing and distribution system which include: timeliness, quantity, quality, choice / competition, price, and channel reach. To this end, a set of six bottlenecks and respective interventions have been proposed with respect to formal sector marketing and distribution.

Bottlenecks and interventions for Seed Marketing and Distribution in the Formal Sector					
	Bottlenecks			Interventions	Owners
F3.1	Producers lack effective channels to market and distribute their seed		F3.1	Support seed producers to market directly to farmers (Direct Seed Marketing)	MoA/RBoAs

F3.2	Variable quality of seed available at distribution channels due to limited quality control by regulatory bodies	F3.2	Strengthen regulatory structures to improve quality control at distribution	RBoAs Regulatory
F3.3	Marketing agents currently lack the means and incentives to distribute seed effectively	F3.3	Equip marketing agents to distribute seed more efficiently as a viable business	FCA/RBoAs
F3.4	Marketing agents lack incentives to effectively measure demand	F3.4	Enable marketing agents to more actively assess seed demand through direct involvement and incentives	MoA/RBoAs
F3.5	Fixed pricing for public varieties dis-incentivizes producers and distributors to invest in quality and marketing	F3.5	Implement open pricing mechanism for seed producers of public varieties	MoA/RBoAs
F3.6	Farmers lack input credit to adopt modern varieties	F3.6	Provide financial services products for farmers to increase input affordability	MoA/RBoAs
F3.7	Producers and distributors lack appropriate access to finance, <i>transport</i> and storage facilities	F3.7	Establish more robust transportation, logistics, and storage systems for seed, and better financing for agents	ESE/RSEs/ Private sector

For context, there are four seed distribution channel options in Ethiopia: The BoA and WBoA, Coop unions, primary cooperatives, private dealers and owned outlets. Recently the DSM approach is creating additional model channels. In 2013, an expanded Direct Seed Marketing (DSM) approach for hybrid maize was piloted in 33 selected woredas in three regions (Oromia, Amhara and SNNP). Fifteen seed producer enterprises (4 Public, 2 unions and 9 private) marketed their seeds in the selected woredas. About 10 varieties of hybrid-maize seed were distributed through cooperatives, seed producer outlets and private stores in the woredas. The distributors were operating on a commission basis paid by the seed producers.

Based on preliminary feedback from a joint MoA-ATA study, this direct seed marketing pilot had improved Timeliness, Enhanced accountability of producers, Better choice of varieties and brands, Less burden for DA's and woreda officials, Reduced cost of seed distribution for the government and Increased demand for certified seed. For instance, in 2013 in Oromia over 90 percent of seed in DSM weredas was distributed.

Bottleneck F3.1: Producers lack effective channels to market and distribute their seed:-

Seed of most cereals is primarily channeled through the regional BoA and distributed by cooperatives, which leaves farmers with limited alternatives to access quality seeds at a competitive price. The local BoA controls the allocation and distribution. However, interviews with seeds producers reveal that multiple private and public companies are interested in marketing their seeds directly and developing their brands.²⁴

Despite the many obvious benefits of DSM, there have been a few challenges that have been observed in the 2013 planting season. These challenges are primarily around the execution of the DSM model as opposed to fundamental issues with the approach. These challenges are Limited number of seed selling outlets at kebele level, Lack of adequate storage facilities at selling points, Participation of DAs/WBoA experts as marketing

²⁴ Based on interviews conducted with Alamayehu, Anno Seed Company, Gadissa Seed Company, and Amhara Seed Enterprise (ASE)

representatives, Fixed pricing, Limited channel beyond cooperatives, technical and infrastructural capacity of producers and marketing agents.

Intervention F3.1: Support seed producers to market directly to farmers (DSM):- Given their scale and resources, capable and certified seed producers should be able to market their seeds directly to farmers once they fulfill the established certification standards for seed distribution.

Bottleneck F3.2: Variable quality of seed available at distribution channels due to limited quality control by regulatory bodies:-

Currently, seed regulatory institutions primarily focus on quality control activities during production and processing. The level of quality control during marketing and distribution of seed is relatively low due to capacity limitations of regulatory authorities. This increases the risk of quality deterioration during transportation, storage and marketing by seed sellers as it may not pass through regulatory checks.

Intervention F3.2: Strengthen regulatory structures to improve quality control at distribution:-This needs a combination of policy enforcement and capacity building. On the policy enforcement side, the regulatory system will need to ensure that all distributors fulfill the minimum criteria to be certified as distributor. Regulatory institutions will need to have the necessary capacity to spot-check and inspect seed distributors regularly and make sure that they comply. In the longer-term, as market oriented system enhances market factors will determine distribution and accountability will be improved. The regulatory bodies will also be equipped with control plot test stations that enable them to check post certification quality within the distribution channel.

Bottleneck F3.3: Marketing agents currently lack the means and incentives to distribute seed effectively:- There are many cooperative engaged as sales agents. Though seed distribution through cooperatives has quite a few advantages; there are several risks and challenges due to the current structure and operation capacity of cooperatives. Most experts agree that many of these cooperatives lack the capacity to operate as well-functioning business entities and do not serve their members and other farmers effectively. Additionally, the new agents that have been identified under DSM also face similar bottlenecks around capacity and storage issues, as well as operating as business entities.

Intervention F3.3: Equip marketing agents to distribute seed more efficiently as a viable business:-These issues that agents currently face will be addressed through Direct Seed Marketing, which focuses extensively on strengthening cooperative and private agents to become more effective distribution channels. Agent certification and training is a crucial component of DSM. The regional level certification agencies should ensure that all seed marketing agents meet a minimum set of standards, provide trainings in seed business management and quality control. Additionally, incentives for DSM sales agents through commissions should be provided by seed producers..

Bottleneck F3.4: Marketing agents lack incentives to effectively measure demand:-

The conventional seed distribution model does not create a need for cooperatives to effectively measure demand. This is a result of specific quantities and prices are decided on by the RBoAs. Additionally, the RBoAs pre-assign seed producers to the specific agents, limiting the agents' ability to procure seed on a competitive basis. Finally, the margins that cooperatives are allowed to charge for seed and fertilizer are fixed and low compared to other countries.



Given that cooperatives as agents neither have control over the quantity of seed they sell nor the commission associated with it, they do not invest in accurately measuring demand. Rather, they rely on the respective BoAs to provide demand estimation. However, demand estimations are based on surveys conducted in the preceding year, which tend to change according to weather patterns. A farmer may change his/her mind for reasons related to grain prices and weather. This results in excess inventories, which translates into storage costs for the cooperatives and financial costs on the invested capital for the inventories.

Intervention F3.4: Enable marketing agents (cooperatives and private) to more actively assess seed demand through direct involvement and incentives:- This can be addressed in two ways:

Directly involving agents in the demand assessment process in the near-term: As cooperatives are usually the closest stakeholder to the smallholder farmer, involving them in demand assessment is absolutely critical.

Establish incentives for agents to accurately assess demand in the long-term through Direct Seed Marketing: Direct Seed Marketing will provide agents more incentives to accurately measure demand. Ultimately, agents will enter contractual agreements with producers to carry their seed, and also be able to negotiate commission payments from producers on the amount of seed they sell. This will significantly increase the need and incentives for agents to accurately measure the demand for the farmers that they serve.

Bottleneck F3.5: Fixed price setting process for public varieties dis-incentivizes producers and distributors to invest in quality and marketing:-

MoA and BoAs at the Federal and Regional levels technically set prices of seed for public varieties with initial input coming from seed producers (both public and private). A price setting process that does not enable for flexibility based on real-time demand affects the volume, quality and timeliness of seed produced and distributed. Specifically, in the current system, investing in quality comes at a cost. If seed producers are unable to recoup this investment through pricing that reflects quality, they are less likely to invest in quality.

Intervention F3.5: Implement open pricing mechanism for seed producers of public varieties:-It is critical to establish pricing based on what the market can bear, and producers should be allowed to set their own prices. Higher seed prices do not necessarily discourage improved seed utilization, as observed from Pioneer and Seed-Co Ethiopia.

Bottleneck F3.6: Farmers lack credit to adopt the inputs associated with modern varieties:-

Farmers need access to financial services, savings, credit or other financial instruments, to purchase inputs related to seed, such as fertilizer, pesticide, herbicide, etc. Currently, many farmers do not have the cash at the time of seed delivery to purchase inputs.

Intervention F3.6: Provide financial services programs for farmers to increase input affordability:-Although producers will take responsibility for popularization and promotion as a result of DSM, effective adoption of seed is driven by multiple factors, including affordability, to which credit will be crucial while not creating a burden on the government, particularly at regional levels. Farmers' ability to afford seed and related inputs may be enhanced through the introduction of support schemes like savings, credit, and possibly, well-designed insurance systems and voucher schemes.

Bottleneck F3.7: Producers and distributors lack appropriate access to finance, transport and storage facilities

There is very limited seed storage capacity in Ethiopia. With the exception of experienced seed producers such as ESE and Pioneer, most seed producers rent storage that was built for grain, or worse, for chemicals. These gaps are especially true of cooperatives, which lack both storage facilities and management skills. The storage facilities in most cooperatives are multi-purpose that led to storage of chemicals and seed in one place which will lead to quality deterioration.

Intervention F3.7: Establish more robust transportation, logistics, and storage systems for seed, and better financing for agents:-To avoid the possibility of seed being adulterated, or mixed with grain, during the time of transportation, there needs to be effective tracking. Furthermore, seed must be stored in proper storage. Moreover, cooperative personnel must be equipped with the required seed warehouse management skills. More importantly, improved access to finance is also important for sales agents.

Chapter 3: Regulatory system

The regulatory system is a cross-cutting component of the seed system. The core activities in regulation include varieties performance approval & PBR protection, quality inspection of seed production fields, as well as laboratory testing of seed samples from multiple sources.

Currently, the Federal level seed regulatory system focus on variety release-protection, setting quality standards and seed-related legal frameworks, export-import issues, certifying federally registered companies, laboratory accreditation and ensure consistency of implementation across regions, with the majority of field/lab quality assurance is done at regional level. This Federal-Regional role sharing is compatible with Ethiopia's broader federal structure.

Regulatory agencies in any country are mostly independently organized, but report to their respective ministries. The reason for this is while regulatory bodies need to operate at a certain autonomy level; they are enforcing regulations that have considerable consequence and need to operate within the political system of the ministry.

3.1 Objective, bottlenecks, and interventions

An autonomous and impartial regulatory system that sets, revises, and enforces seed rule and regulations across the system to protect all stakeholders, especially farmers

Bottlenecks and interventions around regulatory structures keep in mind two critical areas: namely Regulatory structures need to be *autonomous* (finance, managerial and technical) and need to have sufficient capacity - vehicle, equipment, staff capability, room space.

Autonomy: Currently, the federal MoA and Regional BoAs oversee regulation of the seed system and other inputs. BoAs manage the Regional quality control labs which employ inspectors and lab technicians. This creates a conflict of interest due to potential biases toward public regional seed enterprises. Ideally, inspectors and lab technicians should make objective decisions on seed quality, rejecting all seed that does not meet minimum standards regardless of producer. Inspectors and technicians need to be able to document and submit their findings to the regulatory institution without the influence of seed volume interests of high level officials within BoA or fear of retaliation by the concerned seed producer or distributor. In cases where there is disagreement, their findings will need to be challenged through the appropriate appeal process following legal procedures.

Role clarity and coordination: The new seed proclamation that is made official on January 2013 gave the regions a new mandate. While Regional Bureaus lack an actionable coordination mechanism, the federal directorate is expected to take this responsibility.

The specific bottlenecks and interventions are listed below.

Bottlenecks and interventions for the Regulatory System						
	Bottlenecks				Interventions	Owners
R.1	Regulatory institutions lack autonomy and role clarity			R.1	Restructure existing federal and regional regulatory entities	MoA/RBoAs Regulatory
R.2	Regulatory institutions lack capacity			R.2a	Strengthen the capacity of existing seed labs, regional, and federal regulatory bodies	MoA/RBoAs Regulatory
				R.2b	Enhance Field Inspection Capacity	MoA/RBoAs Regulatory
				R.2c	Ensure financial viability / sustainability of regulatory institutions	MoA/RBoAs Regulatory

As indicated, the primary bottlenecks are around autonomy and degree of capacity.

Bottleneck R.1: Regulatory institutions lack autonomy and role clarity:-

Seed regulators lack a certain level of autonomy and role clarity in order to enforce standards consistently and impartially among all stakeholders of the industry. This is especially needed where there are institutional linkages between research institutions, producers, and distributors.

Intervention R.1: Restructure existing federal and regional regulatory entities:- To meet the requirements of the revised seed law, restructuring both federal and regional regulatory bodies is essential to become consistent with the new proclamation. As such, the MoA and Regional Bureaus will need to enhance or set up the appropriate institutions that are defined in the law and provide them with the necessary organizational structures.

There are certain areas where the Federal regulatory body needs to closely coordinate with regions – namely seed certification training, dissemination of legal frameworks, and conducting visits to confirm that the regions' activities are aligned with legal frameworks, and ensuring that regional seed laboratories fulfill requirements.

Bottleneck R.2: Regulatory institutions lack capacity:-

Regulatory capacity is currently insufficient at all levels. Regions have limited number of staff and vehicles, a situation exacerbated by the continued expansion of seed production.

A. **Field Inspection capacity gaps:-** Since 2000, the demands on field quality control in Ethiopia have greatly increased due to fivefold increase in seed production (area as well as volume), increase of seed producing companies/enterprises, increasing seed farm fragmentation, increasing of additional assignments due to introduction of DSM which calls for agent certification and supply chain quality control.

In spite of the above changes in the seed sector, the field inspection capacity of the seed labs has remained constant. In particular, there is a shortage of vehicles for field visits, rendering most labs unable to visit more outlying seed producers or out-growers. This limits inspection of all seed produced in the sector and thus large amounts of seeds are sent to market without passing national seed standards.

- B. Seed sample testing capacity:-** In-laboratory seed quality testing has to be primarily conducted between February and May. Given this narrow time window, sufficient resources to conduct seed quality testing are critical. Current challenges include insufficient room space, lack of equipment, and spaces that currently combine office and lab-related activities. As a result of these inadequate resources, testing all the required number of samples across the various factors has not been possible. For example, the seed health test is an important indicator of seed quality, but it is not used in a consistent fashion due to limited testing equipment, room space and trained personnel.
- C. Human Resource Gaps:-** Most seed labs are staffed with technical experts who are under skilled due to high staff turnover, which is due in part to low compensation. A lack of expertise results in a lack of trust and credibility when the results of the seed labs for rejection or approval.

Interviews with BoA's staff indicate that the training programs could be improved to be more comprehensive. For example, current training does not reflect the most up-to-date information on newly released varieties and their morphological descriptors, testing equipment maintenance, differentiating noxious seeds and seed borne disease; therefore, inspectors are not fully aware of the expected morphological characteristics of new varieties, weeds and diseases, leading to poor inspection results.

In addition, MoA- Plant Health Regulatory Department (APHRD), which provides some of the training and monitoring support for BoAs, is severely constrained by staff size. In 2011, the department was working with less than 4 experts, who are expected to work on regulatory issues across the agriculture sector in the country, not just the seed system.

Intervention R.2a: Strengthen the capacity of existing seed labs, regional, and federal regulatory bodies:- A need assessment study led by ATA recommended that the existing labs should be capacitated, in line with their strategic seed production locations, as opposed to building new labs in less strategic locations. Strengthening the capacity of existing seed labs will focus on the following key areas:

Improving coordination of seed producers with seed labs: As the period for timely field inspection and seed testing is short, there is a need for high level coordination between seed labs and seed producers. The producers should notify the seed labs of their production plans well in advance. This will prevent the delay in quality certification and hence the delay in seed delivery.

National accreditation of Regional seed labs: Accreditation of regional seed labs is the responsibility of the federal government. Regions should work closely with the Ministry of Agriculture to ensure that labs are performing up to seed lab national standards.

Develop Expertise of Technical Staff: In order to develop the expertise of technical staff at the Seed labs, technical staff should be given trainings. Two distinct training programs are recommended _short and long term technical development. Beyond increasing the skill level of technical staff, the trainings will give incentive for staff to stay in seed labs longer. Retaining staff also has the benefit of developing institutional knowledge.

Reduce staffing turnover through higher wages and/or benefits for technical staff: High turnover has been a critical issue for seed labs. ATA's needs assessment determined a key contributor to staff retention would be an increase of the wages and benefits of the technical staff. Beyond higher compensation, other ways to improve retention are effective training, an organizational structure with opportunities for promotion, and other benefits such as housing and family support.

Increase technical to support staffing ratio with specific focus on field inspectors: Regions should assess the current workload of the Seed labs and reconfigure staffing to address the high demand workload areas. Currently, certain regions have a high administrative-to-technical staff ratio, which demonstrates a poor use of resources considering the purpose of the Seed labs. As much as possible, seed labs should rely on regional administrative support and save budgets allocated to the Seed labs for technical staff. Most notably, expectations for outputs of field inspectors are unrealistic considering their workload. Regions should increase technical staffing, specifically for field inspection.

One way to manage resources is to employ a generalist approach, hiring technical staff that both inspect and test seed. During times of high inspection demand lab staff will participate in field inspection. Immediately upon completion of inspection, when seed samples are tested, inspection staff will participate in seed testing. Legally, a field inspector cannot take responsibility for testing seeds he/she collected; but to address this, seed lab heads can arrange possible reshuffling.

- **Expand lab infrastructure:** Regions should invest in expanding facilities to enable more area for seed testing. Storage, office space and testing labs should be in distinct rooms
- **Increase access to equipment:** Quality lab equipment will enable labs to test samples more quickly and precisely.

Intervention R.2b: Enhance Field Inspection Capacity: is achieved by increasing access to vehicles and improving clustering of seed production fields.

Improve Vehicle access: Vehicles are a critical in that it ensures visiting fields before end of critical crop growth stages. The timing of these stages is sensitive and requires multiple vehicles in time. Therefore, it is important to note that the region and other developmental partners invest in additional vehicles for Seed labs.

Improve Field Clustering: In addition to increased vehicle access, clustering production sites will allow for the efficient use of resources and the ability to inspect more fields. Clustered production makes field inspection more time efficient with less travel time between fields. At the woreda and regional levels, governments should help smallholder farmers consolidate their plots. Furthermore, the governments should support farmers to rent or lease neighbouring lands to further increase production.

Introduce Quality Declared Certification System:- Given the increasing burden of the regulators, less stringent quality control system is expected to be introduced, namely the Quality Declared Seed (QDS) regulatory system. In the QDS system, seed producers have the option to market without undergoing full inspection and quality testing procedures. Instead, the regulatory system will develop a limited but critical set of regulations that ensure quality seed is being produced, and certified taking sampled areas into account (commonly 10%). It is envisioned that CBSPs will be the primary beneficiaries of the QDS system.

QDS scheme is not designed to compete with the existing conventional quality control system, but rather complement it and ensure farmers have greater access to quality seed. The primary responsibility of seed quality under the QDS scheme lies with the seed producer, with minimal quality control by the official regulatory body. Generally, the QDS scheme is implemented based on the following principles:

- A list of varieties eligible to be produced as QDS need to be established.
- QDS producers are required to be registered at an appropriate regulatory authority
- The authority checks at least 10 percent of the seed offered for sale
- QDS is administered under its own quality standard and directive.

Intervention R2.c: Ensure financial viability / sustainability of regulatory institutions: In order to reduce the cost burden on the federal and regional governments, it is critical to establish structures that enable sustainability of inspection by legalizing fees certification such that seed companies are obligated to pay for the certification service provided by the regulatory bodies.

Chapter 4: Intermediate seed sector

4.1 Importance of Intermediate Sector

Community-based producer groups are organized and supported by a combination of development partners, regional bureaus of agriculture, seed enterprises, etc. These groups can include cooperative seed producers' unions that are not formally licensed or registered in the production of certified seed as part of the formal sector.

The **Intermediate Sector** is intended to formally recognize such community-based groups as a separate entity from the informal and formal sectors. Although there are several groups that could fall into a middle category outside of formal and informal.

4.2 Defining the intermediate sector: key players involved

Definition of the newly recognized intermediate sector

The intermediate sector is specifically defined as business-oriented community-based groups (producer cooperatives or unions) that are engaged in the multiplication and distribution of noncertified seed of either modern or local varieties:

- The multiplication and distribution is generally within that local community and nearby areas (as opposed to farmer entrepreneurs that may scale beyond the local community).
- These groups are not formally registered, but have the option of applying for a newly introduced seed regulatory scheme, Quality Declared Seed (QDS). As part of the seed proclamation, QDS is a less stringent quality standard and is meant to complement the existing convention of the formal quality control system to enable a less resource-intensive, more scalable method of quality control.

There are specific boundaries drawn around the intermediate sector. A description of each of the groups is indicated below, with rationale around why the last two groups comprise the intermediate sector.

Large Farmer Entrepreneurs: A group with strong potential to distribute improved seed is the growing set of farmer entrepreneurs.

NARS Managed Popularization: Research based CBSP Popularization focuses on the introduction of new crop varieties into the local seed system by NARS through direct involvement of extension experts, development agents, and farmers.

NARS Managed Participatory Variety Selection (PVS) and Participatory Plant Breeding (PPB): This approach was designed and initiated in response to poor adoption of modern varieties that are developed in research stations of different research institutes³⁰.

³⁰ Belay et al. (2008) and Witcombe (2005)

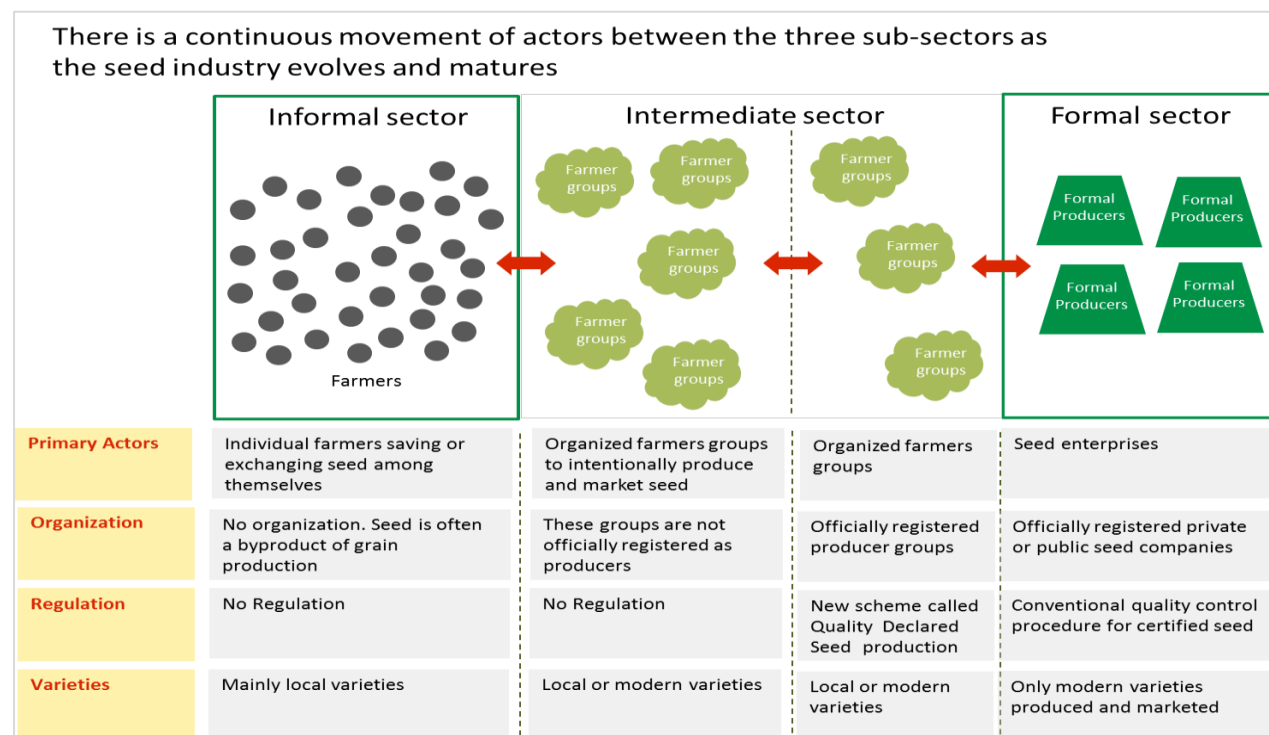
Both NARS Managed Popularization and PVS/PPB: involve formal contracts with research institutions and are intended to inform variety selection and registration for established public and private seed producers, as opposed to local communities. As such, they should be considered part of the formal sector.

Conservation-Oriented Producers: Actors in this category promote the conservation of crop genetic resources by working towards seed security of local varieties (landraces).

Organized out-grower groups: produce and market seed for large-scale seed companies through contracts. While many of them will continue to produce under contract, a subset of these groups can become independent producers in their communities.

Community-managed local seed businesses: Beyond contract-based out-growers, there are community-managed local seed businesses that have potential to become independent local seed businesses that could be engaged in the production certified seed and QDS. These businesses are generally producer cooperatives. Currently, these producers are not formally registered and regulated, but produce seed for their local community. While some of these businesses eventually transition into Formal Sector entities, the goal of the Intermediate Sector is to provide a route by which these independent businesses can register and supply seed to their local communities.

Exhibit 5



The major challenges that operational Community-Based Seed Producers (CBSPs) face are: (i) lack of adequate technical and infrastructural capacity, (ii) weak support by and linkage with formal sector institutions, (iii) technical and logistical difficulty of clustering farmers' plots, and (iv) lack of a sustainable business model as most depend on external NGO support.

4.3 Key components and overall framework of the intermediate sector

The seed value chain of the intermediate sector is comprised of three key components: community-based seed multiplication, community-based marketing and distribution and the cross cutting seed regulatory system.

Community-Based Seed Production (CBSP): In the Ethiopia's context, two types of CBSP groups have been recognized to operate in the intermediate sector: (i) out-grower CBSPs that are contracted by formal sector seed enterprises (ii) CBSPs that operate as independent local seed enterprises.

Community-Based Seed Distribution: In case of out-grower seed production, seed marketing is the sole responsibility of seed companies/ enterprises. Under such arrangements, participating farmers are allowed to officially retain some portion to meet their needs from the total seed output. The level of CBSP involvement in marketing depends on their maturity and capacity. In most cases, seed produced by these groups is either taken up by regional BoAs or development partners that usually support their very creation. However, a few of these CBSPs directly market their seed to customers.

Given all this, the objective for the intermediate sector is the following:

A well-functioning community-based seed production and distribution system operated by farmers' groups that gradually develops into independent, self-sustaining seed enterprises to sufficiently meet the local-specific needs of respective farming communities and contribute to increased income to the producers.

Summary of Bottlenecks and Interventions of seed production in the intermediate sector

The goal for seed production in the intermediate sector is to create small to medium scale local seed enterprises that can fulfill unmet needs in seed production. As such, a set of four bottlenecks and respective interventions has been outlined below.

Bottlenecks and interventions for Seed Production in the Intermediate Sector				
	Bottlenecks		Interventions	Owners
N1.1	Many community-based producers are not operationally or financially sustainable	N1.1	Improve operational efficiency and sustainability of existing CBSPs so that they are able to gradually transition into independent business entities	FCA/RBoAs
N1.2	Lack of adequate access to early generation seed (basic or C1)	N1.2	Improve linkage between CBSPs and research centers which maintain early generation seed	EIAR/RARIs
N1.3a	CBSPs lack capacity to produce sufficient volume of seed to satisfy demand gaps	N1.3	Develop contractual agreements and build operational capabilities of CBSPs to improve quantity of seed	RBoAs/FCA
N1.3b	CBSPs have low seed recovery rates from their member farmers due to poor business planning			
N1.4	Quality of seed produced and supplied by CBSPs often fails to meet minimum quality standards (based on the formal certification process)	N1.4	Promote Quality Declared Seed Regulatory System (QDS) to ensure baseline seed quality	MoA/RBoA Regulatory

Bottleneck N1. 1: Many community-based producers are not operationally or financially sustainable

The major reasons that contribute to the unsustainable business models of community-based seed producers include:

CBSPs lack adequate access to financial resources to purchase inputs: Farmers usually lack adequate cash particularly at the time inputs need to be produced since cash becomes available only after harvest season. Smallholder farmers often have limited access to financial services. In addition, for CBSPs that operate independently require finance for seed cleaning and storage, to buy-back seed from out-grower³⁵. As a result, CBSPs require a robust and extended cash flow. Unfortunately, conventional financial institutions such as MFIs, commercial banks, etc., are less familiar with the needs of these local seed business and also consider such investments as high-risk^{36,37}.

CBSPs are overly dependent on NGO support and are not self-sustainable:-Most CBSPs organized and supported by development partners through technical and infrastructural support. Public institutions such as BoAs, research institutes, and HLEs (Higher Learning Institutes) usually participate in the provision of basic seed and other inputs, training of farmers and cooperative personnel on different issues, provision of credit, seed marketing, and other activities. However, support provided so far has not yet enabled most of these producers to become self-sustaining and long-lasting entities³⁸.

InterventionN1. 1: Improve operational efficiency and sustainability of existing CBSPs:-Developing effective CBSPs will require access to financial resources as well as technical and infrastructural capabilities.

The following are some of the potential solutions for improving CSBP's' access to financial resources:

- Launching a revolving CBSP fund
- Providing credit guarantees to lending institutions: Providing credit guarantees is one option to catalyze adequate financing to CBSPs in the near term. Some of such institutions include rural lenders such as MFIs, rural SACCOs, CBE, etc.

The following are some potential solutions for improving CBSPs' capabilities in order to enable them to operate as standalone businesses

- Strengthening knowledge of CBSPs in areas such as seed business management, entrepreneurship, cooperative leadership, and business planning
- Avoiding over-dependence of CBSPs on development partners: by designing more targeted assistance programs in which CBSPs graduate from NGO support
- Promoting the establishment of new community-based local seed businesses in high and low potential areas for seed
- Establishing technical and infrastructural capabilities including processing machines, appropriate channels / storefronts, etc.

Bottleneck N1.2: Lack of adequate access to early generation seed (EGS):-

EGS is usually allocated by their respective BoAs to self-producing & marketing Cooperatives³⁹. However, for infant cooperatives EGS is allocated by PSEs within CBSM programs or to some by development partners who procure EGS & provide them⁴⁰. However, in most instances, supply of EGS falls short of the effective demand.

Some of the root causes for the unavailability of sufficient quantities of EGS include the following:

³⁵ Wamura-Sako small-scale farmers seed producers'

³⁶ Understanding seed systems used by small farmers in Africa: Focus on markets

³⁷ Sentimela P.S. et al (2004): Successful community-based seed production strategies

³⁸ Alemu D. (2011)

³⁹ Local Seed Business Newsletter (2011): Issue 7

⁴⁰ Alemu D. (2008): Farmer-based seed multiplication in the Ethiopian seed system- approaches, priorities and performance

- **Producer cooperatives are not adequately linked with PSEs and research for accessing source seed:** allocation and distribution of source seed has been solely managed by BoAs, which does not allow a direct link between EGS producers and cooperatives with contractual arrangements
- **Overall shortage of source seed:** the amount of EGS produced by research and PSEs falls far short of the increasing demand due to CBSPs expansion. The problem of seed shortage for CBSPs is especially acute for seeds of hybrid varieties compared with non-hybrids⁴¹.

Intervention.2: Improve linkage between CBSPs and research centers which maintain early generation seed: There are two major routes by which CBSPs can improve their links with research centers.

- Contractual arrangements between CBSPs and research/PSEs for better EGS access:
- Promote EGS production by selected CBSPs or other private producers in partnership & contract basis with research centers or public seed enterprises: CBSPs with extensive experience in seed production have potential to get involved in the EGS production, particularly for self-pollinating varieties. This has been demonstrated in the SNNP region in which pre-basic seed of selected wheat varieties was produced by Edget Seed Multipliers and Marketers Union^{42 43}. Similar initiatives could be scaled up for EGS production by CBSPs that have extensive knowledge and experience in certified seed production.

Bottleneck N1.3a: CBSPs lack capacity to produce sufficient volume of seed to satisfy demand gaps

The following are some of the major root causes for low seed production volumes:

Poor monitoring and supervision of seed production plots: Individual plots are small and often located far from each other making proper follow-up and recovery of seed highly difficult.

Inadequate follow-up and support by government structures at various levels:

Poor agronomic practices: lack of adequate knowledge in proper agronomic practices reduces yield potential of specific varieties.

- **Infrastructural capacity:** producers usually lack adequate access to modern seed processing and storage facilities that are affordable and meet the specific needs of seed producer cooperatives.
- **Lack of access to supporting inputs:** This includes lack of access to credit and unavailability of other inputs beyond seeds such as fertilizer, etc.

Bottleneck N1.3b: Community-based seed producers have low seed recovery rates from their member farmers due to poor business planning

The amount of seed collected, processed and sold by producer cooperatives is usually low due to high default rates by out-grower farmers participating in CBSM. Assessment studies conducted by ATA revealed that most of the well-established producers' unions had low to medium seed recovery rates (<60%)⁴⁴. Some of the major reasons for low seed recovery rates are as below:

⁴¹ Alemu D. (2011): Farmer-based seed multiplication in the Ethiopian seed system- approaches, priorities and performance

⁴² Daniel D. (2012): On-farm pre-basic and basic seed production by Edget Seed Multipliers and Marketing Cooperative Union- Self Help Africa in collaboration with SARI

⁴³ Wolkite Seed Laboratory (2012)

⁴⁴ ATA survey of three seed producer cooperative unions in Oromia and SNNP regions (The unions covered in this survey are Meki Batu, Becho Wolliso and Edget Unions)

- **Unattractive premiums:** Prices offered by formal sector enterprises or producer cooperatives are often unattractive to contract growers partly due to untimely market surveys intended to determine purchasing seed prices. Premium prices are usually fixed at times when grain prices are at their lowest. As a result, out-grower farmers are often not willing to sell the seed to contracted companies and instead sell it to local markets or exchange part of the seed with neighbors and relatives.
- **Lack of adequate technical skillsets and infrastructural capacities to effectively plan, monitor, and manage contractual arrangements:** Agreements that are entered into with individual out-grower farmers are often technically difficult to enforce as cooperatives deal with large number of farmers. Moreover, farmers do not consider such agreements legally binding and disputes arising from defaults are difficult to manage through arbitration.

InterventionN1. 3: Develop contractual agreements and build operational capabilities of CBSPs to improve quantity of seed: this can be made possible through

- **Improve the knowledge of out-growers, cooperative personnel, DAs, etc. on contract planning, management and enforcement.** This could be achieved by providing targeted and continuous training on the above mentioned issues.
- **Strengthen the logistical and storage capability of CBSPs** so that they are able to effectively collect, transport and store seed from out-grower farmers
- **Promote proper clustering of plots** and the use of relatively larger individual plots in farmer-based seed multiplication schemes
- **Develop guidelines or manuals on appropriate agronomic practices** that tailored to community-based seed multiplication
- **Ensure proper pricing mechanisms for out-growers** that CBSPs source from in order to maximize retrieval rates

Bottleneck N1.4: Quality of seed produced and supplied by CBSPs often fails to meet minimum quality standards

This is linked to the following ground fact.

Producers usually lack adequate technical knowledge in seed production and quality assurance: Several reports indicate that CBSPs have very limited technical knowledge in seed production techniques^{45,46,47,48}. For instance, during the 2007/08 production season, field inspection reports showed that more than 8 % of total seed produced by ESE's CBSM program was rejected compared to a less than 1 percent rejection rate on ESE's own farms⁵¹.

Difficulty to implement conventional quality control by the regulatory bodies: Regulatory institutions face huge technical and logistical constraints to conduct regular quality control activities on farmers' plots that are fragmented in nature and usually located far from infrastructure. Such regulatory activities tend to be

⁴⁵ Sahlu Y. et al (2008): The farmer-based seed production and marketing scheme- lessons learnt

⁴⁶ MacRobert J.F. (2008): Supporting the development of small to medium scale seed enterprises in Sub-Saharan Africa

⁴⁷ Ere Union seed producers and marketing cooperatives, Gimbichu district, Oromia region

⁴⁸ Wamole farmers' cooperative for maize seed production in Boricha woreda, SNNP region

⁵¹ Dalberg (2012); ESE annual report (2008)

resource intensive and are not economically feasible given the multiple rounds of field inspections and lab tests that need to be conducted based on the conventional certification scheme.

Existing quality standards are too stringent for community-based seed producers that have limited technical and infrastructural capacity to adequately meet conventional quality standards.

Intervention N1.4. Promote Quality Declared Seed Regulatory System (QDS) to ensure baseline seed quality:- As indicated on the regulatory section of this strategy, those CBSPs that do not build sufficient capacity to meet conventional quality control standards can be registered under the QDS certification scheme. But this scheme should be considered as a transition to the conventional certification system for it pends their marketing scope to their localities. Thus, CBSPs should be supported by development partners to ensure their quick transition to the conventional certification.

Component N2: Marketing and distribution in the intermediate sector

Historically, seed marketing and distribution has been considered as the weakest segment of most community-based seed production and distribution programs^{52,53}. Specifically, community based seed producers (CBSPs) have not had clear routes to market and distribute seed, outside of contracts to formal sector producers.

In order to create an independent intermediate sector, it is critical to establish a seed marketing system that links CBSPs with both formal and informal channels. Linkage to the channel structure established by Direct Seed Marketing (DSM) will be absolutely critical for the long-term.

Summary of bottlenecks and interventions

Bottlenecks and interventions for Seed Marketing and Distribution in the Intermediate Sector				
	Bottlenecks		Interventions	Owners
N2.1	Lack of adequate and sustainable market for CBSPs	N2.1	Support CBSPs to progressively market their seed using multiple marketing strategies and distribution channels	FCA/RBoAs
N2.2	CBSPs are currently engaged in limited crop and varietal portfolio (# and type of crops and varieties)	N2.2	Effectively link CBSPs with research and conservation institutes through contractual agreements for accessing source seed of diverse crop varieties	FCA/RBoAs

Bottleneck N2. 1: Lack of adequate and sustainable market for CBSPs

One of the major challenges for CBSPs is lack of adequate and sustainable markets that has resulted in low amount of quality seed sold by CBSPs. The direct role of CBSPs in marketing is limited due to unwise support of BoAs and NGOs for they have not been targeting towards self-sustainability. Though, currently, development partners are showing improvements in areas of their support, CBSPs are still at early stages and lack adequate technical knowledge in seed business management⁵⁴.

⁵² Alemu D. (2011): Farmer-based seed multiplication in the Ethiopian seed system- approaches, priorities and performance

⁵³ Sahlul Y. et al (2008): The farmer-based seed production and marketing scheme- lessons learnt

⁵⁴ Alemu D. (2011)

Intervention N2.1: Support CBSPs to progressively market their seed by linking them to multiple marketing strategies and distribution channels:- CBSPs should be supported in such a way to find customers and market their seed by themselves linking them through DSM and conventional distribution channels on contractual arrangement basis.

Bottleneck N2.2: CBSPs are currently engaged in limited crop and varietal portfolio (number and type of crops and varieties)

According to data on nearly three hundred primary cooperatives, nearly 70% of community-based seed production stems from a single variety of tef, and four varieties of wheat.⁵⁵ This clearly indicates that the crop and varietal portfolio of CBSPs is quite limited to address diverse agro-ecologies and environments.

Intervention N2.2: Effectively link CBSPs with research institutes through contractual agreements for accessing source seed of diverse crop varieties:- One key solution to improve the portfolio of CBSPs is a stronger linkage to the public research centers that produce improved seed varieties. However, there is also an opportunity to provide a stronger linkage to local seed varieties by setting up contracts and/or partnerships with Community Seed Banks (CSBs) and institutions such as the Institute of Biodiversity Conservation (IBC).

Chapter 5: Informal seed sector

5.1 Introduction and background

Typically, the informal seed system can be defined as unregulated seed operations that are largely characterized by localized efforts of seed production & quality management. It is the dominant source of seed (more than 80% of the agricultural production).⁵⁶ This figure is especially high for self-pollinating and vegetative propagated crops.

In the informal sector, the availability of sufficient seed may not be consistent or of guaranteed quality due to several limitations. This is particularly true after a poor harvest season disaster conditions. Additionally, the concept of seed quality varies significantly between modern varieties and local varieties.

5.2 Scope of the informal sector strategy

This section of the seed sector strategy will primarily focus on specific farmer groups, crops and agro-ecologies that are under-served by the formal and intermediate sectors due to several reasons already discussed. More specifically: in most of the less focused crops and agro-ecologies the informal play a critical role in meeting the food security needs of the vast majority of smallholder subsistence farmers.

5.3 Key components of the informal sector

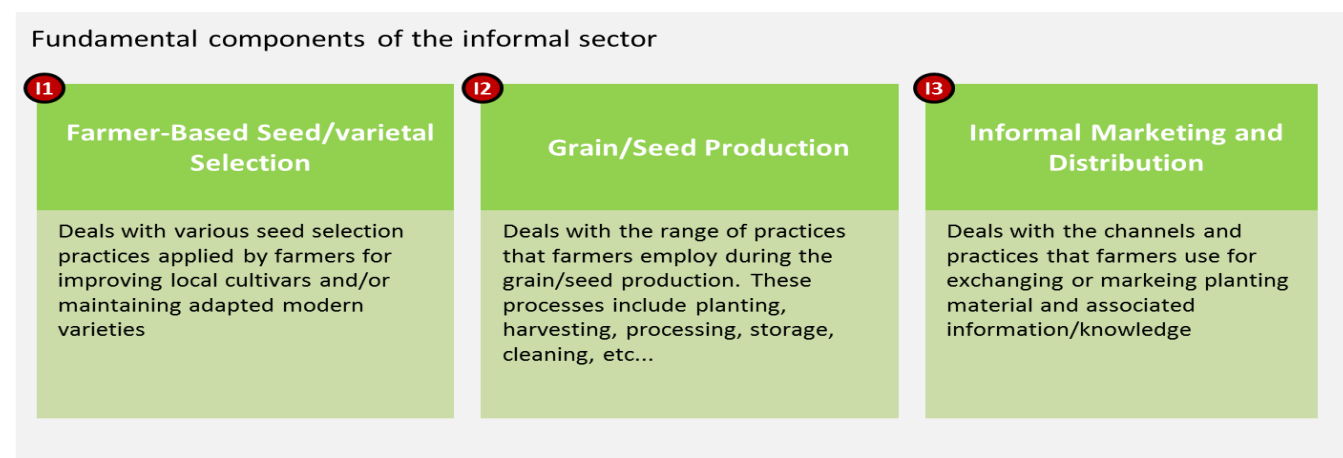
In the Ethiopian context, the informal seed sector involves three fundamental process-oriented components. These are (1) seed/varietal selection and maintenance, (2) grain/seed production and (3) informal

⁵⁵ CBSP Sector-wide Data, Alemu D. and Abebe A. (2014)

⁵⁶ Johannes M.M. Engels (2008)

distribution. Usually, these components do not follow a particular sequence as clearly defined in the formal sector. Moreover, there are also overlaps and interactions between these components.

Exhibit 17



The three major components of the informal sector are described briefly as follows:

I1. Seed/variatal selection and maintenance: This component refers to a range of practices that farmers employ in selecting and maintaining their planting material. In fact, farmers have been the principal managers of agro-biodiversity of crop varieties and seeds. To this end, farmers' traditional selection practices, coupled with more formal selection, help maintain the genetic diversity of crops.

I2. Grain/seed production:- An "informal" seed grower could be defined as a farmer who is not a member of an organized seed production program and produces "seed" for personal use or for exchanging with neighbors or relatives. Informal seed growers are not subject to the seed law⁶³.

I3. Informal marketing and distribution:- This component refers to various processes and practices that farmers employ for exchanging planting material and associated information.

Given all this, the following objective for the informal sector has been highlighted:

A well-developed informal seed system that is well linked with the formal and intermediate sectors to adequate amounts of high-quality seeds that meet specific needs of farmers in diverse agro-ecological zones of Ethiopia while maintaining local genetic diversity.

Component I1.1: Farmer-based seed/variatal selection and maintenance

Successful farmer-based seed and variatal selection requires adequate knowledge as well as clear coordination with respective institutes, ensuring the back-and-forth exchange of varieties (modern and local alike). The three bottlenecks and interventions below are focused on these areas:

Bottlenecks and interventions for Farmer-based seed / variatal selection and maintenance		
Bottlenecks	Interventions	Owners

⁶³ Gregg B.R. and van Gastel A.J.G., 2000

I1.1	Farmers may lack adequate knowledge in best seed selection techniques that help maintain genetic uniformity of modern varieties and enhance the performance of existing local varieties	I1.1a	Improve dissemination of best practices in seed / varietal selection and maintenance for the informal sector	RBoAs/ Extension
		I1.1b	Improve linkage between farmers and NARS crop improvement programs through Participatory Plant Breeding and Participatory Varietal Selection schemes	EIAR/RBoAs
I1.2	Germplasm of local crop genetic resources collected by conservation institutes have not been adequately characterized	I1.2	Strengthen pre-breeding component of Ethiopia's biodiversity conservation institute and promote increased use of indigenous germplasm in breed improvement programs of the NARS	IBC
I1.3	High risk of genetic erosion of local varieties with the increased adoption of varieties developed through the formal sector	I1.3	Support the conservation of local genetic diversity by strengthening the capacity of community-based conservation institutes to reduce risk of genetic erosion	IBC

Bottleneck I1.1: Farmers may lack adequate knowledge in best seed selection techniques that help maintain genetic uniformity of modern varieties and enhance the performance of existing local varieties

Farmers perform different selection methods at varying stages of “seed” production that include: Selection from stored grain and selection after harvest, but before threshing and storage, where the best-looking ears and heads are kept separately for seed. Given these factors, the two major challenges are:

Lack of knowledge on proper recycling: Several studies have indicated that seed replacement rates are very low in Ethiopia as farmers recycle formal seed beyond the recommended levels. This is due to lack of adequate knowledge in recycling seed management, limited access to fresh seed from the formal sector and inability to afford seed. If seed is not properly refreshed by farmers, it is highly likely that the quality deteriorates due to physical mixing and damage during production and harvesting by traditional methods. The exhibit on the next page provides a breakdown of purchasing rates for different crops, demonstrating the high recycling rates prevalent among farmers.

Lack of knowledge on broader agronomic issues, including quality improvement and maintenance: Farmers usually lack adequate knowledge on improved seed selection and quality maintenance techniques that can enhance the quality of seed^{64 65}.

Intervention I1.1a: Improve dissemination of best practices in seed / varietal selection and maintenance: Ethiopia's current extension system should design and introduce local varieties seed specific packages that

⁶⁴ Asfaw A. (2008): Participatory varietal evaluation and breeding of the common bean in the Southern region of Ethiopia

⁶⁵ Almekinders C. and Louwaars N.P. (2008): Supporting farmers in maintaining and selecting seeds of local varieties

are targeted to effectively increase farmers' awareness on seed production, selection, seed quality and pest management. To this end, the following interventions could be implemented:

- Revise existing crop-specific extension packages to incorporate seed-specific needs.
- Develop various crops, seeds and geographies oriented manuals on proper seed/variety selection, recycling, and quality maintenance techniques.
- Use demonstration plots at Farmer Training Centers (FTCs) and ATVETs to demonstrate seed selection and quality maintenance tools

Intervention I1.1b: Improve linkage between farmers and NARS crop improvement programs:-Several Research centers in Ethiopia employed approaches like Participatory Varietal Selection (PVS) and Participatory Plant Breeding (PPB) to diversify the informal system. To effectively realize the benefits of participatory crop improvement programs, the following interventions are proposed:

- **Promote the participation of farmers in multiple stages of variety development** and testing of experimental varieties in farmers' fields (target environment)
- **Identify and support local seed/variety selectors** that are well recognized by their respective communities
- **Institutionalize PPB and PVS in Ethiopia's National Agricultural Research System** to ensure participation of farmers and other clients at multiple stages of crop breeding:- develop national PPB and PVS guidelines and strengthen knowledge-base of breeders in PPB and PVS.
- **Encourage the increased use of local crop germplasm** in the crop improvement programs of NARS

Bottleneck I1.2: Germplasm of local crop genetic resources collected by conservation institutes have not been adequately characterized

Characterization of crop germplasm is essential for effective utilization of crop genetic resources from conservation institutions. So far, preliminary evaluation of basic morphological and agronomic characteristics has been undertaken for close to 70 percent of all accessions⁷⁰ collected by the Institute of Biodiversity Conservation⁷¹. However, detailed evaluations of characteristics such as nutritional composition, tolerance to drought, and soil salinity and diseases have only been done on very few crop accessions⁷².

Intervention I1.2: Strengthen pre-breeding component of Ethiopia's Biodiversity Conservation Institute and promote increased use of indigenous germplasm in breeding improvement programs of the NARS:-To fully benefit from the diverse crop genetic resource of the country, the following intervention activities are proposed:

- **Improve linkage between conservation institutions and research centers of the NARS** so that breeding programs can increasingly use local germplasm to develop improved varieties
- **Strengthen research component (i.e., resources, tools, etc.) of Ethiopia's conservation institutes** so that it is able to adequately conduct pre-selection of local germplasm

⁷⁰ Germplasm accession is a collection of genetic resources for a given organism. For plants, the germplasm may be stored as a seed

⁷¹ IBC (2007): Country report on the state of plant genetic resources for food and agriculture

⁷² Balcha and Tanto T. (2008): Genetic diversity and informal seed systems in Ethiopia

- **Develop / improve variety release guidelines** so as to allow for the release of varieties that are developed based on farmer's criteria and preferences (including PVS/PPB) and local/farmers varieties.

Bottleneck 13.3. High risk of genetic erosion of local varieties with the increased adoption of varieties developed through the formal sector

As the coverage of the formal sector increases, an increasing number of local varieties are being replaced with modern varieties. This poses potential risk of genetic erosion if proper conservation measures are not put in place. For instance, a study conducted in Eastern Shewa revealed an estimated loss of wheat local diversity ranging between 75-100 percent of total landraces that are grown in the studied districts⁷⁴. Among a variety of reasons, the gradual replacement of local varieties has a potential to deprive breeders from access to important traits.

The IBC in collaboration with the Global Environmental Facility (GEF) program of the UN supported the establishment of 12 CSBs in selected districts of Amhara, Oromia, SNNP and Tigray, from 1994-2002. Currently, however, only 2 of the 12 CSBs are currently operational while the rest were disbanded due to various challenges. The following include some of the major challenges CSBs and other related farmer associations face:

- **Untimely and poor seed return rates:** farmers who borrow from their respective CSBs usually fail to return back the seed partially timely or fully not. As a result, the seed stock in CSBs dwindles over time, which in turn affects its sustainability.
- **Insufficient demand for seeds of local varieties:** with the ever-increasing supply of modern varieties, the demand for seeds of local varieties is decreasing. Administration of seed banks that usually cover a number of widely spread communities has proven to be challenging and complicated
- **Limited capacity:** most CSBs lack adequate technical and infrastructural capacity to undertake their activities⁷⁵. Farmers' knowledge is often very limited in proper seed management practices such as seed cleaning, storage and lack of uniform standards of seed management.
- **Unsustainable operating model as CSBs depended on NGO support:** most of these CSBs were supported by and were overly dependent on NGOs from the onset of their establishment.

Intervention 3: Support the conservation of local genetic diversity by strengthening the capacity of community-based conservation institutes to reduce risk of genetic erosion:-To effectively conserve the genetic diversity of crop varieties, strengthening capacity of local conservation institutes linking them with conventional conservation institutes (IBC, EIAR, ILRI, etc.) is strongly demanded. This could be achieved by implementing the following activities:

I/ Evaluate and re-design the operating model of community-based conservation institutes to ensure their sustainability and efficiency: CSBs are primarily aimed at increasing local seed security and contribute to conservation of local crop diversity through continued use. Implementing the following interventions could enhance the sustainability of these institutions:

- Develop a business case where CBSs are able to effectively market their surplus seed,

⁷⁴ Tsegaye B. and Berg T. (2007): Genetic erosion of Ethiopian tetraploid wheat landraces in Eastern Shewa, Central Ethiopia

⁷⁵ Role of community gene/seed banks in the conservation and use of crop genetic resources in Ethiopia

- Design a system where CSBs will benefit from Ethiopia's access and benefit sharing agreements with potential companies that intend to use local genetic diversity for commercial purposes⁷⁷
- Assist CSBs in drafting guidelines or bylaws that govern their day-to-day operations: includes seed collection, quality control, and distribution with clear descriptions of roles and responsibilities of each CSB member.

II/ Strengthen the technical and infrastructural capacity of community-based conservation institutes:-
Personnel should be trained on best seed management practices and access to associated farm infrastructure that is simple and affordable including storage facilities and seed cleaners.

III/ Integrate the community-based conservation activities with existing extension system

IV/ Enhance linkage between formal and informal crop conservation institutions

V/ Improve CSB's access to ex situ collections of local germplasm stored at IBC: .

VII/ Improve and support documentation and exchange of local conservation practices in order to keep farmers and CSBs abreast of latest practices.

VIII/ Establish new community-based conservation institutes such as CSBs in selected strategic locations that are crop biodiversity hot-spots: The goal is to expand beyond the twelve existing CSBs, with a focus on locations in each crop with a high number of local cultivars.

Component I2: Grain/seed production in the Informal Sector

Farmer-based seed production requires access to best practices that balance both modern and traditional methods, as well as a seed emergency program to provide appropriate buffer in challenging times. The three bottlenecks and interventions below focus on these areas:

Bottlenecks and interventions for Farmer-based grain/seed production				
	Bottlenecks		Interventions	Owners
12.1	Farmers are currently unable to produce sufficient yield and quantity seeds for preferred varieties	12.1	Promote application of appropriate agronomic practices that enhance yield and quantity	RBoAs Extension
12.2	Seed emergency programs are poorly designed and executed, which is especially a problem for the informal sector	12.2	Set up an efficient National Seed Emergency System that effectively responds to natural/manmade disaster conditions by contributing to seed security	MoA/RBoAs
12.3	High risk of poor quality seed due to poor cleaning and storage practices	12.3	Strengthen farmers' awareness in proper seed management methods and improve access to affordable implements	RBoAs Extension

Bottleneck 12.1: Farmers are currently unable to produce sufficient yield and quantity of seeds for preferred varieties

⁷⁷ Engels J.M.M. et al (2008): Roles of community gene/ seed banks in the conservation and use of crop genetic resources in Ethiopia

Various factors affect the availability of seed in the informal sector. The major causes include:

- Lack of adequate knowledge of best on-farm agronomic practices significantly reduces grain yield and hence seed yield.
- Climatic and environmental challenges: Successive seasons of drought or flood usually require repeated re-planting of farmers' saved-seed that results in depleting farmers' seed stock⁷⁹.
- Lack of adequate local seed reserve entities such as community seed banks (already covered in previous component).
- Intervention I2.1: Promote application of appropriate agronomic practices that enhance yield and quantity:- can be achieved focusing on major agronomic activities that include Improving seed bed management & planting techniques, Maintaining planting time⁸¹, pest and weed management and implement recommended cropping system.

Bottleneck I2.2: Seed emergency programs are poorly designed and executed

Ethiopia has suffered from recurrent drought for at least the past 30 years, prompting a succession of emergency responses including seed aid. Although seed aid programs contributed immensely towards achieving seed security in disaster conditions, several challenges have been known to limit effectiveness and efficiency. The following include some of the major challenges of Ethiopia's seed emergency system:

- **Lack of national emergency seed needs assessments:** Currently, needs assessment for seed aid is extrapolated indirectly from food security assessments. Several assessments in different parts of the country have shown that food and seed security are not identical, but rather complementary. The trigger used to signal a "need for seed aid" is often a "harvest failure"; however, not all production shortfalls necessarily translate to a seed shortfall. As a result, emergency seed needs are usually skewed as calculations that are extrapolated from "food gaps".

At present, there are three seed assistance contexts: emergency seed aid for acute situations, special assistance programs for chronically stressed areas, and seed aid as part of development programs⁸⁴. There appears to be no clear emergency seed aid/assistance strategy that can address the various seed assistance contexts of the country during and after the occurrence of natural disasters.

- **Lack of national seed security/assistance guideline:** Seed aid in Ethiopia is supply-driven rather than demand or problem-driven. This is mainly attributed to lack of guidelines that clearly outline steps in the design, assessment, and implementation of emergency seed programs or interventions in response to natural and/or human-induced disasters in the different agro-ecological zones of the country.
- **Poor coordination among seed aid programs:** Various NGOs and programs do not have a clear mechanism by which to coordinate allocation efforts in emergency situations.
- **Lack commitment to implement seed quality control system designed for emergency seeds:** Multiple experiences in the past have indicated that introduction of emergency seed that has not passed adequate

⁷⁹ David, Mukandala and Mafure (2002); Louwaars (2007) and McGuire (2008)
Abdul Shukor et al. (2009)

⁸⁴ FAO-MoA (2009)

quality control & quarantine measures has, in multiple instances, lead to introduction of devastating insect pests, plant diseases and noxious weeds⁸⁵.

Intervention 12. 2: Set up an efficient National Seed Emergency System that effectively responds to natural/manmade disaster conditions by contributing to seed security:-In the informal seed system, a seed-secure farmer may not necessarily be one who produces all seed needs. According to FAO guidelines, for farmers to be seed secure three major conditions must be met: a) seed has to be available, b) access able to farmers c) the quality has to meet producer or consumer preferences.

Seed insecurity is often found among farmers that are marginalized in one of the three ways: economically by poverty, lack of land or labor; ecologically as in areas of repeated drought or degraded land; and politically insecure areas. Usually, chronically seed insecure populations may experience continual shortages of seed to plant, encounter difficulties in acquiring off-farm seed for lack of cash, and routinely have nothing available but low quality seed of less preferred varieties⁸⁶.

Therefore, to effectively respond to specific seed security constraints, seed emergency programs need to be designed and targeted properly. To this end, assessment of the three key dimensions of seed security (availability, access, and quality) can help relief workers better understand and prepare for emergency situations. However, there have been few explicit assessments of seed insecurity in Ethiopia during or even after an emergency. The following are some of the most important long-term intervention activities proposed to improve the current emergency seed system of the country:

- I. Develop a national strategy for seed reserve and emergency assistance:
- II. Set up an independent institution for assistance activities, including assessing, planning and implementing seed assistance activities throughout the country
- III. Implement a special seed quality control system for emergency seed conditions
- IV. Set aside an independent fund (revolving fund) dedicated for emergency seed aid
- V. Improve effectiveness and sustainability of existing seed emergency programs aimed at improving seed security, mostly organized by NGOs

Bottleneck 12.3: High risk of poor quality seed due to poor seed cleaning and storage practices

Harvesting should be well timed to allow quick drying of the seed, thereby reducing shattering or field infestation losses. However, farmers usually delay harvesting & threshing, primarily due to unavailability of sufficient labor during peak harvest /threshing season. There are many traditional processes and techniques which are time and labor intensive and are of sub-optimal quality and inputs are hard to access.

Losses during storage could be large and are often exacerbated by climatic conditions. A study by McGuire (2007) showed that 40% of interviewed farmers in Chiro, Eastern Hararghe Zone, reported poor germination at times of late rains⁸⁷. On the other hand, lack of adequate skillsets in operating/maintaining modern storage facilities and its associated cost may prohibit farmers from using such facilities.

⁸⁵ FAO-MoA (2009): Emergency seed aid guidelines for Ethiopia (Not officially endorsed by MoA)

⁸⁶ Catherine L. (2006): Seed vouchers in emergency programming- lessons from Ethiopia and Mozambique

⁸⁷ McGuire S.J. (2007)

Intervention I2.3: Strengthen farmers' awareness in proper seed management methods and improve access to affordable implements: To improve their seed management skill work should be done in seed cleaning and seed storage access and management. This can be achieved Increase awareness of farmers in best seed processing and storage management techniques, Improve farmers' access to affordable on-farm seed/grain cleaning implements that meet local needs, Encourage smallholder farmers to construct small-scale storage such as Pit Storage Bag (PSB) and brick and metal silos and Promote knowledge-based storage management practices.

Component I3: Marketing and distribution in the informal sector

Farmer-based seed production requires access to best practices that balance both modern and traditional methods, as well as a seed emergency program to provide appropriate buffer in challenging times. The three bottlenecks and interventions below focus on these areas:

Bottlenecks and interventions for Farmer-based grain/seed marketing and distribution			
	Bottlenecks	Interventions	Owners
I3.1	Limited local seed diffusion and dissemination networks / access points for exchanging / marketing seeds of local cultivars or recycled improved varieties and associated knowledge	I3.1 Strengthen and promote innovative local seed marketing networks for efficient seed diffusion	IBC/WBoAs

Bottleneck I3.1: Limited local seed diffusion and dissemination networks/access points for exchanging/marketing seeds of local cultivars or recycled improved varieties and associated knowledge

Due to the isolated nature of the informal sector, seed exchanging/marketing networks are usually limited to particular community structures, for instance, family or local institutions. Social, economic and cultural conditions tend to shape introduction and exchange of planting materials in farming communities. Availability of seed is constrained even more during times of environmental and social disasters or disruptions as self-saved seed stocks are lost and farmers might not be able to access seed locally⁹⁰.

Intervention I3. 1: Strengthen and promote innovative local seed marketing networks for efficient seed diffusion:- The following platforms could be used to strengthen local seed exchange/marketing networks:

Organize community Seed Fairs: to promote exchange of seed between farmers and communities The two major benefits are improved availability of seed for preferred local varieties and maintenance of crop genetic diversity under farmers' natural conditions.

Set up new and strengthen existing Community seed banks (CSBs) or conservation associations across the country. Community seed banks play an important role in providing seed security and conservation of local crop diversity.

⁹⁰ IFPRI (2009): Local markets, local varieties- rising food prices and small farmers' access to seed





Chapter 6: Modalities for Different Crop Categories

Short- and Long-Term Modalities for Different Value Chain Components in the Seed System, by Crop Category				
Crop category	Varietal dev't & breeder seed production	Seed production		Marketing & Distribution
		Pre-basic & basic seed production	Certified seed production	
Hybrids	<ul style="list-style-type: none"> Short-term: varietal development will continue to be dominated by public research with active collaboration with CG centers for germplasm access and capacity building Long-term: the role of private sector in varietal development will increase significantly* 	<ul style="list-style-type: none"> Short-term: public research to withdraw, while public and private seed producers take responsibility Long-term: combination of public & private seed enterprises have a key role in producing pre-basic & basic 	<ul style="list-style-type: none"> Short-term: combination of public and private, with reducing involvement of public Long-term: Highly driven by private sector 	<ul style="list-style-type: none"> Short-term: quota-based distribution through cooperatives, and growing use of direct agents (both cooperative & private) Long-term: marketing agents responsible for all inputs
SPVs cereals (non-industrial applications)	<ul style="list-style-type: none"> Short-term: remains to be dominated by public research Long-term: public research will continue to dominate varietal development with increased role by private sector for crops with industrial and nutritional values** 	<ul style="list-style-type: none"> Short-term: public seed producers to dominate pre-basic & basic Long-term: combination of public & private seed enterprises produce pre-basic & basic 	<ul style="list-style-type: none"> Short-term: primarily driven by public producers, with increasing scale of CBSPs Long-term: driven by combination of public producers and CBSPs, with some private involvement 	<ul style="list-style-type: none"> Short-term: quota-based distribution through coopes, emerging use of direct agents (cooperative & private) Long-term: marketing agents responsible for all inputs, and few CBSPs
Oil crops	<ul style="list-style-type: none"> Short-term: remains to be dominated by public research Long-term: public research will continue to dominate varietal development with increased role by private sector for crops with industrial and nutritional values 	<ul style="list-style-type: none"> Short-term: given lack of quantity, research to multiply pre-basic seed; public seed enterprises to multiply basic seed Long-term: public seed enterprises to dominate, with increasing private and agribusiness involvement 	<ul style="list-style-type: none"> Short-term: primarily driven by public seed producers Long-term: combination of CBSPs. public, with increasing private and agribusiness involvement 	<ul style="list-style-type: none"> Short-term: quota-based distribution through coopes, limited involvement of agribusinesses Long-term: marketing agents responsible for all inputs



Pulses	<ul style="list-style-type: none"> Short-term: remains to be dominated by public research Long-term: public research will continue to dominate varietal development with increased role by private sector for crops with industrial and nutritional values 	<ul style="list-style-type: none"> Short-term: given lack of quantity, research to multiply pre-basic seed; public seed enterprises to multiply basic seed Long-term: public seed enterprises to dominate, with increasing private and agribusiness involvement 	<ul style="list-style-type: none"> Short-term: primarily driven by public seed producers Long-term: combination of CBSPs. public, with increasing private and agribusiness involvement 	<ul style="list-style-type: none"> Short-term: quota-based distribution through coopes, limited involvement of agribusinesses Long-term: marketing agents responsible for all inputs
Fruits	<ul style="list-style-type: none"> Short-term: stronger role of the public research in varietal development with some level of participation by private sector Long-term: both public and private playing stronger role*** 	<ul style="list-style-type: none"> Short-term: depending on function, either public enterprises, community-based seed producers, or agribusinesses Long-term: strong dominance of agribusinesses & CBSPs 	<ul style="list-style-type: none"> Short-term: CBSPs and agribusiness are both heavily involved Long-term: CBSPs and agribusiness continue to be heavily involved 	<ul style="list-style-type: none"> Short-term: CBSPs and agribusiness, through private agents Long-term: CBSPs and agribusiness, through private agents
Vegetables	<ul style="list-style-type: none"> Short-term: OPVs will continue to be dominated by the public research while hybrids will be dominated by the private research Long-term: the same trend 	<ul style="list-style-type: none"> Short-term: currently dominated by private sector Long-term: continue to be dominated by private sector 	<ul style="list-style-type: none"> Short-term: currently dominated by private sector Long-term: continue to be dominated by private sector 	<ul style="list-style-type: none"> Short-term: currently dominated by private agents Long-term: continue to be dominated by private agents
Root crops	<ul style="list-style-type: none"> Short-term: primarily driven by public, with some private involvement Long-term: primarily driven by private 	<ul style="list-style-type: none"> Short-term: primarily driven by public research, with some private involvement Long-term: primarily driven by private, with limited public involvement 	<ul style="list-style-type: none"> Short-term: primarily driven by CBSP & private involvement Long-term: primarily driven by private and CBSP 	<ul style="list-style-type: none"> Short-term: currently dominated by CBSP with some private agent involvement Long-term: continue to be dominated by CBSP with some private agent involvement
Industrial crops	<ul style="list-style-type: none"> Short-term: will continue to be dominated by public research with limited role of private Long-term: dominant 	<ul style="list-style-type: none"> Short-term: public producers, with some private involvement Long-term: dominated by private and agribusiness 	<ul style="list-style-type: none"> Short-term: public producers, with some private involvement Long-term: dominated by 	<ul style="list-style-type: none"> Short-term: dominated by public sector (through coops) and agribusinesses Long-term: dominated by



	engagement of the private sector with limited role of public research. Privates are expected to introduce genetically modified germplasm (e.g. BT cotton, etc)		private and agribusiness	agribusinesses, sometimes through private agents
Forage	<ul style="list-style-type: none"> ▪ Short-term: will continue to be public dominated ▪ Long-term: possible increase of private research role and continued dominance by public sector 	<ul style="list-style-type: none"> ▪ Short-term: will be dominated by public producers ▪ Long-term: largely private sector and agribusiness driven 	<ul style="list-style-type: none"> ▪ Short-term: will be dominated by public & CBSP producers ▪ Long-term: largely private sector and agribusiness driven 	<ul style="list-style-type: none"> ▪ Short-term: driven by public producers (through coops) & CBSPs ▪ Long-term: driven by CBSPs, through agents



6.1. Additional Context on Crop-Specific Modalities

Additional considerations and rationale for the value chain model for different types of crops is laid out below, based on a review of existing literature on the topic for more mature seed systems:

For Hybrid Seeds

This is the category that should move most strongly toward privatization, both in terms of research and production. Looking across all African seed systems, hybrids out-perform OPVs by 18-20% across all yield ranges,⁹¹ and are more difficult for farmers to save due to segregation.⁹² This should result in a pricing that reflects the relatively higher value and outcomes related to hybrids, as well as a compelling source of recurring annual revenue due to the need to purchase hybrids year-after-year. The business case for the private sector to produce hybrid seeds has strong logic.

For Self-Pollinating Cereal Varieties (Without High Industrial Value)

Self-pollinating wheat, tef, and barley are recyclable and also command a lower price in the market, reducing the incentive of private companies to participate in the varietal development and production of this seed. Community-based seed producers enable an anchor and limit the touch points through which improved varieties of wheat and tef can be introduced, while still maintaining a decentralized enough system to provide farmers easy access to seed.

Limiting improved SPV cereal seed to only public seed enterprises (PSEs) will reduce farmers' access to these seeds, resulting in lower adoption. That said, PSEs should continue to focus on SPV cereals as this is a critical gap not met by the private sector, and CBSP production will likely not be sufficient enough to satisfy the demands for these crops across Ethiopia.

For Self-Pollinating Oil Crops, Pulses, and Cereals with Strong Industrial Value

Considerations are similar as to Self-Pollinating Cereal varieties, with the exception of a more promising demand sink for these crops, resulting in much stronger agri-business involvement. It is important to consider the involvement of private agri-business in industrial and nutritional contexts. Additionally, the market for industrial cereal crops such as malt barley and durum wheat will have similar dynamics; in fact, specific malt producers have indicated a desire for land to multiply their own proprietary varieties. But the outgrower scheme remains the major site sink of seed production under CBSPs, public and private producers. Besides registered QDS varieties also can be used considering their industrial potential. In certain instances, until domestic capacity is maintained importing of pulses and malt barely varieties should be place in the plate of options.

For Fruits, Vegetables, and Root Crops

Irrigative crops command a higher price in the market, and as a result, this increases the value of seeds produced. High-value crops, such as vegetables, can have far more expensive seeds, especially for improved varieties with dramatically higher yields. This points to a greater involvement of the private sector in these crop categories, which is already true for vegetables. Federal & regional governments should work to creat fertile environment in accessing irrigation sites for seed production of such seeds for CBSPs,PSEs and Private seed companies .

For fiber Crops as input to industries

⁹¹ John MacRobert, CIMMYT, "Supporting and stimulating farmer access to improved maize germplasm through public-private partnerships in the seed value chain", 2013

⁹² CSA-India, "Open Source Seed Systems", 2010



Industrial crops again have strong revenue potential, resulting in high potential for private and agribusiness activity. In addition, the recent proclamation has allowed for GM technology to be used.⁹⁵ As such, the long-term vision is for all activity from research through to distribution to be driven by the private sector.

For Forage Seeds

Forage seed is an especially underserved area in Ethiopian agriculture, and is very important to developing a robust livestock sector in Ethiopia. Fodder seed production has risks due to being an intermediate product in the livestock value chain, as opposed to a final good.⁹⁶ As such, the current strategy is to work with smaller local players, such as Eden Field Agri-Seed Enterprise and Nissir Agro Industry Cooperative Enterprise, and continues to have public and development players focus on research and varietal development.⁹⁷ Despite the fact different varieties for various agro-ecologies are released from public research in collaboration with CGIAR, forage seed production is not yet an attractive area for privates. However, as the market for forage seed scales, private players will get involved more heavily.

Chapter 7: Modalities for Different Crop Categories

7.1 An integrated and comprehensive seed sector development approach

The three sectors, formal, intermediate and informal, has distinct yet overlapping features that complement each other. The three sectors are envisioned to interact in specific ways to maximize the performance of the overall seed system. The an integrated seed system development model developed so far recognizes the pluralistic nature of the seed system and promotes complementarity between value-chain components of each sector. To realize this, a two-pronged approach is proposed:

- A. **Linkage strengthening:** this refers to strengthening of linkages and interactions that already exist between value-chain components of each seed sector
- B. **Linkage creation:** create new linkages and interactions between new and existing value-chain components of each seed sector

The following two schematic presentations depict the existing and envisioned state of Ethiopia's seed system. In the new system, new components and linkages are proposed across the value-chain of the three sectors. On the other hand, existing components and linkages will be strengthened so that the overall seed system functions in a streamlined manner.

⁹⁵ Thomson Reuters Foundation, "Ethiopia Plans GM Crop Boost for Cotton Industry", January 2014

⁹⁶ ILRI/IFPRI, "Forage seed supply in Ethiopia", May 2011

⁹⁷ ILRI/FeedSeed Planning Meeting, February 2014

7.2 Linkages and interactions between the three seed sectors

Linkages	Relevant Sectors	Owner
A Establish contractual agreements between CBSPs and formal enterprises to exchange seed at various levels	Formal and intermediate	ESE/RSE/Private sector/ Mbps
B Establish linkage between CBSPs and formal distribution outlets (e.g., cooperatives, agents)	Formal and intermediate	CBSPs/FCA/Private sector
C Popularize Quality Declared Seed (QDS) to increase awareness of CBSPs and strengthen capacity of seed regulatory authorities	Formal and intermediate	MoA Regulatory/CBSPs
D Ensure farmers get involved in the varietal development and release process to account for their needs	Formal and informal	EIAR/RARI
E Enable farmers to continue to maintain local genetic diversity	Formal and informal	IBC
F Leverage informal networks for both the formal and intermediate sector to distribute seed	All sectors	FCA/RBoAs
G Enable the exchange of knowledge across all three sectors	All sectors	FCA/RBoAs

Linkage A: Establish contractual agreements between CBSPs and formal enterprises to exchange seed at various levels:- This will enable two major developments. Firstly, this will provide CBSPs adequate access to source seed (basic or C1) from formal institutions without having to heavily rely on research for source seed. Additionally, CBSPs can sell to formal producers to ensure a sufficient market for CBSPs beyond their local communities, in turn enabling them to operate as self-sustaining businesses.

Linkage B: Establish linkage between CBSPs and formal distribution outlets (e.g., cooperatives, agents):- As channels and outlets grow through direct seed marketing, they can provide a route for not just formal seed producers to distribute seed, but also smaller CBSPs. This can be done through formal linkages and contracts. On the other hand, informal mechanisms such as seed fairs and regular forums could enhance marketing of seed among CBSPs themselves.

Linkage C: Popularize Quality Declared Seed (QDS):- Once the independent regulatory authorities establish a process for QDS, it will be critical to find ways to educate CBSPs. QDS can enable both intermediate players to effectively scale. However, for QDS to work, regulatory staff must be properly trained in the appropriate techniques and procedures of QDS.

Linkage D: Ensure farmers get involved in the varietal development and release process to account for their needs:- This made happen through participatory plant breeding (PPB) and participatory varietal selection (PVS); while improving research centers` and the farmers / community`s financial, operational and technical capacity. Ultimately, research centers will adequately use local crop germplasm in their crop improvement programs. In order for this to be effective, contractual agreements between research institutions and seed enterprises to ensure adequate breeder and pre-basic seed of the right varieties will be critical.



Linkage E: Enable farmers to continue to maintain local genetic diversity maintaining their legally supported benefits:- On the other hand, it is equally critical to make sure research institutions are linked to community groups such as CSBs and other conservation organizations that are engaged in maintaining crop genetic diversity. Additionally, CSBs can receive incentives to maintain genetic diversity, e.g., improving output market for farmer-produced seed, and potentially also commercialize genetic diversity by making sure that farmers benefit from access for benefit sharing agreements that are signed between international companies.

Linkage F: Leverage informal networks for both the formal and intermediate sector to effectively distribute seed:- As the informal sector forms the majority of the seed system, it is critical for the other sectors to work through the informal distribution networks that already exist. This will effectively improve the dissemination of improved seed. Ways to effectively do this include organization of local community seed fairs, farmer / producer associations to promote knowledge and planting, and more broadly, the multi-channel Direct Seed Marketing model.

Linkage G: Enable the exchange of knowledge across all three sectors:-Best practices across all stages and sectors of the seed system, be it quality control, effective inventory management and storage, planting techniques, should be effectively disseminated. Direct Seed Marketing provides an opportunity to streamline the flow of knowledge and ensure that it is exchanged in a relatively structured fashion. Linking DSM to FTC / demonstration plots and providing training pamphlets on planting techniques can improve this further.

7.3 Implications for Gender

Women constitute half of the rural farming community in Ethiopia, contributing 48% of labor over all agriculture, and 70% of household food production.⁹⁸ A number of studies indicate that investments in women's access to agricultural inputs and agronomic practices can bring up to a 30% increase in production.⁹⁹ As such, interventions need to clearly involve men and women, support women's institutions and target at least 30% female-headed households in all extension services.¹⁰⁰

Gender Intervention 1: In supporting producers to market directly to farmers (Direct Seed Marketing):-The Direct Seed Marketing pilots should aim to ensure that women get sufficient opportunities while recruiting seed sellers and effectively track progress against this goal. According to IFPRI's evaluation, 17.4% of seed sellers participating in DSM were women, with the highest female participation in SNNP (28%). Moving forward, DSM should aim to have 25-30% female seed sellers by 2015.

- Additionally, DSM pilots should aim to target woredas with a higher portion of female households. The initiative was successful in this regard last year, with 5.4% female-headed households in DSM woredas vs. 4.4% female-

⁹⁸ Ministry of Agriculture, Environmental Protection and Development Report (1992), A Case study On Women's Access to Agricultural Extension Services

⁹⁹ Creating Gender-Responsive Agricultural Development Programs- an orientation document February 2012, Bill and Melinda Gates foundation

¹⁰⁰ Ethiopia's 5-year Growth and Transformation Plan, 2011-2015.

headed households in non-DSM woredas. The difference was strongest in Oromia (6.3% female-headed households in DSM vs. 1.8% female-headed households in non-DSM).¹⁰¹

Gender Intervention 2: In providing financial services programs for farmers to increase input affordability:- According to the 2012 ATA baseline survey, only 5.4% of female-headed households received credit for agricultural purposes, compared to 13.2% of male-headed households. The goal will be to increase the female-headed households receiving agricultural credit to 30%, and married women receiving agricultural credit to 20% by 2015. Another way to further involve women in credit disbursement is to have both heads of households co-sign on loans.

Gender Intervention 3: In strengthening the capacity of existing seed labs, regional, and federal regulatory bodies:- As new bodies are established and strengthened, it is critical to encourage the role of women professionals in the workplace. The MoA and EIAR have assigned focal departments to focus on gender equality, and as such, opportunities to incorporate female professionals in technical activities such as field inspection and laboratory testing are very important when thinking about how to capacitate regulatory bodies.

Gender Intervention 4: in improving operational efficiency and sustainability of existing CBSPs so that they are able to gradually transition into independent business entities

- Focusing and building the capacity of female-led community based seed producers is absolutely critical. For instance, data from one of the emerging coop seed enterprise (Edget Union) indicated that membership of female is only 12%.¹⁰² As more interventions are developed for the intermediate sector, tracking female membership and involvement will effectively allow CBSPs to serve as another route for women's empowerment.
- The lack of financial services for inputs has an impact on the financial sustainability for CBSPs to cover production costs, including seed cleaning and storage. As discussed, male headed households are more likely to receive credit for agricultural purposes than female headed households, so there should be mechanisms to ensure financial support for female-led CBSPs.

Gender Intervention 5: In developing contractual agreements and build operational capabilities of CBSPs to improve quantity of seed:-In general, contract-related activities such as serving as an out-grower for a seed company or community-based seed producers should entail an inclusive-decision making process. Specifically, the enterprises involved need to ensure that household decisions are joint - according to FAO, relationships can be adversely affected in situations where payments are given to men for work largely carried out by the female members of the household.¹⁰³

Gender Intervention 6: In improving linkage between farmers and NARS crop improvement programs through Participatory Plant Breeding (PPB) and Participatory Varietal Selection (PVS) schemes:- When engaging farmers in participatory research, NARS should reach out to both male and female members of a household in order to get the broadest set of insights possible. A key area is while judging the attractiveness of a newly developed variety before it is presented to the National Variety Release Committee (NVRC). Women will be more likely to provide feedback on its characteristics beyond yield potential – including key health-related issues and effectiveness in preparation.

¹⁰¹ IFPRI, Tables from Farmer and Seller Surveys, October 2013

¹⁰² On Farm Pre-Basic and Basic Seed Production, June 2012, Self-Help Africa

¹⁰³ Contract Farming: Partnerships for growth, 2001, FAO

Chapter 8. Implementation Plan

8.1 Interventions in Progress

	Priority interventions already begun	Component	Owner
F1.1a	Strengthen breeding capacity of National Agricultural Research Institutions	Formal varietal development	EIAR/NARC
F1.3a	Develop contractual agreements and effective pricing / marketing mechanisms between research and extension and seed producers	Formal varietal development	EIAR/NARC
F1.5a	Establish an autonomous regulatory entity at the federal level that will also be responsible for conducting varietal evaluation, release, registration, and PVP (Plant Variety Protection)	Formal release & registration	MoA Regulatory Directorate
F1.5b	Develop new and amend existing variety release and registration guidelines detailing steps and processes of varietal evaluation, release and registration	Formal release & registration	MoA Regulatory Directorate
F1.6	Build capacity of the variety evaluation, release, and registry authority	Formal release & registration	MoA Regulatory Directorate
F1.7	Complete revision of Plant Breeders' Rights Proclamation and draft regulations for immediate implementation	Formal release & registration	MoA Regulatory Directorate
F2.4a	Define and enforce roles and responsibilities among seed producers	Formal seed production	MoA/RBoAs
F2.4b	Support private sector producers to meet needs for commercially attractive crops	Formal seed production	MoA/RBoAs
F3.1	Support seed producers to market directly to farmers (Direct Seed Marketing)	Formal seed and distribution	MoA/RBoAs
F3.2	Strengthen regulatory structures to improve quality control at distribution	Formal seed and distribution	RBoAs Regulatory
F3.3	Equip marketing agents to distribute seed more efficiently as a viable business	Formal seed and distribution	FCA/RBoAs
F3.4	Enable marketing agents to more actively assess seed demand through direct involvement and incentives		MoA/RBoA
F3.5	Implement open pricing mechanism for seed producers of public varieties	Formal seed and distribution	MoA/RBoAs
R.1	Restructure existing federal and regional regulatory entities	Regulatory system	MoA/RBoAs Regulatory
R.2a	Strengthen the capacity of existing seed labs, regional, and federal regulatory bodies	Regulatory system	MoA/RBoAs Regulatory
R.2b	Enhance Field Inspection Capacity	Regulatory system	MoA/RBoAs Regulatory
R.2c	Ensure financial viability / sustainability of regulatory institutions	Regulatory system	MoA/RBoAs Regulatory

8.2 Priority Interventions

	Priority interventions already begun	Component	Owner
F1.2	Establish a clear link between federal and regional research institutes to ensure coordination and avoid duplication of efforts	Formal varietal development	EIAR/NARC
F1.3b	Ensure variety development incorporates traits beyond simply yield	Formal varietal development	EIAR/NARC
F1.3c	Research institutions and producers should work to actively popularize new improved varieties to drive adoption	Formal varietal development	EIAR/NARC
F2.5	Develop effective out-grower management by seed producers	Formal seed production	ESE/RSEs/Private sector
F2.6a	Support seed producers with sufficient financing and land so that they can scale effectively to satisfy unmet demand	Formal seed production	ESE/RSEs/Private sector
F2.6b	Support seed producers to improve business planning, marketing, and operations management	Formal seed production	ESE/RSEs/Private sector
F3.6	Provide financial services products for farmers to increase input affordability	Formal seed and marketing distribution	MoA/RBoAs
F3.7	Establish more robust transportation, logistics, and storage systems for seed, and better financing for agents	Formal seed and marketing distribution	ESE/RSEs/Private sector
N1.1	Improve operational efficiency and sustainability of existing CBSPs so that they are able to gradually transition into independent business entities	Intermediate seed production	FCA/RBoAs
N1.2	Improve linkage between CBSPs and research centers which maintain early generation seed	Intermediate seed production	EIAR/RARIs
N1.3	Develop contractual agreements and build operational capabilities of CBSPs to improve quantity of seed	Intermediate seed production	FCA/RBoAs
N1.4	Promote Quality Declared Seed Regulatory System (QDS) to ensure baseline seed quality	Intermediate seed production	MoA/RBoA Regulatory
N2.1	Support CBSPs to progressively market their seed using multiple marketing strategies and distribution channels	Intermediate seed marketing and distribution	FCA/RBoAs
I1.1b	Improve linkage between farmers and NARS crop improvement programs through Participatory Plant Breeding and Participatory Varietal Selection schemes	Farmer-based seed / varietal selection and maintenance	EIAR/RBoAs
I1.2	Strengthen pre-breeding component of Ethiopia's biodiversity conservation institute and promote increased use of indigenous germplasm in breed improvement programs of the NARS	Farmer-based seed / varietal selection and maintenance	IBC

8.3 Secondary Interventions

	Priority interventions already begun	Component	Owner
F1.1b	Strengthen the financial viability of the public research system	Formal varietal development	EIAR/NARC
F1.4	Ensure high capacity for maintainers of each improved variety through designated maintenance breeders and sufficient nucleus seed	Formal varietal development	EIAR/NARC
F2.1a	Provide guidelines/standards to enforce internal quality control for all seed producers	Formal seed production	MoA Input Regulatory Directorate
F2.1b	Enable seed producers to build capacity for internal quality control	Formal seed production	RBoA/ESE/RSEs Private sector
F2.2	Strengthen national seed demand estimation and local market assessment	Formal seed production	MoA/RBoAs/ESE/RSEs/Private sector
F2.3	Increase capacity of breeding institutions to produce higher quantities (linked to Intervention 1.1a)	Formal seed production	EIAR/RARIs
N2.2	Effectively link CBSPs with research and conservation institutes through contractual agreements for accessing source seed of drivers crop varieties	Intermediate seed production	FCA/RBoAs
I1.1a	Improve dissemination of best practices in seed / varietal selection and maintenance for the informal sector	Farmer-based seed / varietal selection and maintenance	RBoAs/Extension
I1.2	Strengthen pre-breeding component of Ethiopia's biodiversity conservation institute and promote increased use of indigenous germplasm in breed improvement programs of the NARS	Farmer-based seed / varietal selection and maintenance	IBC
I1.3	Support the conservation of local genetic diversity by strengthening the capacity of community-based conservation institutes to reduce risk of genetic erosion	Farmer-based seed / varietal selection and maintenance	IBC
I2.1	Promote application of appropriate agronomic practices that enhance yield and quantity	Farmer-based grain / seed production	RBoAs Extension
I2.2	Set up an efficient National Seed Emergency System that effectively responds to natural/manmade disaster conditions by contributing to seed security	Farmer-based grain / seed production	MoA/RBoAs
I2.3	Strengthen farmers' awareness in proper seed management methods and improve access to affordable implements	Farmer-based grain / seed production	RBoAs Extension
I3.1	Strengthen and promote innovative local seed marketing networks for efficient seed diffusion	Farmer-based grain / seed marketing and distribution	IBC/WBoAs

Chapter 9. Conclusion

Experiences in countries such as India, Kenya, as well as within Ethiopia, indicate that access to improved seed can play a substantial role in increasing the productivity, and as a result, income of smallholder farmers.

However, realizing this will require a range of interventions across the different components of the value chain - variety development, variety release, production, and distribution - as well as the different sectors - formal, intermediate, and informal - of the seed system. As discussed, critical points of focus include the breeding and release of high-quality varieties, establishing a competitive market environment across seed production and distribution, a robust community based seed-production system to satisfy SPV demand, and improving best practices in seed management for the informal sector. These areas must be underpinned by a strong regulatory system that effectively incentivizes relevant stakeholders of the seed industry while ensuring the supply of high-quality seed.

Aligning stakeholders to effectively develop and coordinate priority interventions is essential - this will be done through a series of workshops, and ultimately, a national council to manage the transformation of the seed system through the implementation of the proposed strategic interventions. In addition, systematic, regular and objective monitoring and evaluation (M and E) of progress with the overall Strategy and its different components is critical to success.

The success of this strategy will be assessed against the immediate output of timely delivery of high-quality seed at the right quantities, and then, the longer-term outcomes of yield and income. This strategy is ultimately predicated on producing a single outcome: a well-functioning seed system that enables farmers to access seed of improved varieties at the right quality, quantity, time, and competitive price, from a range of producers and distribution channels. The achievement of this outcome will be measured closely through a series of indicators that will be measured at baseline levels in 2014 and monitored periodically to track progress toward this outcome based on parameters set by multiple stakeholders.

Appendix A: Summary of Bottlenecks and Interventions

	Bottlenecks		Interventions	Owners	
Varietal Development in the Formal Sector					
F1.1	Lack of resources in public research system to effectively develop improved varieties and produce breeder seed	F1.1a	Strengthen breeding capacity of National Agricultural Research Institutions	EIAR/NARC	
		F1.1b	Strengthen the financial viability of the public research system	EIAR/NARC	
F1.2	Lack of clear communication, role clarity, and accountability among various research institutions and units	F1.2	Establish a clear link between federal and regional research institutes to ensure coordination and avoid duplication of efforts	EIAR/NARC	
F1.3	Limited commercialization and adoption of improved varieties by seed producers and farmers	F1.3a	Develop contractual agreements and effective pricing / marketing mechanisms between research and extension and seed producers	EIAR/NARC	
		F1.3b	Ensure variety development incorporates traits beyond simply yield	EIAR/NARC	
		F1.3c	Research institutions and producers should work to actively popularize new improved varieties to drive adoption	EIAR/NARC	
F1.4	Lack of capacity of maintainer institutions results in risk of poor quality	F1.4	Ensure high capacity for maintainers of each improved variety through designated maintenance breeders and sufficient nucleus seed	EIAR/NARC	
Varietal Release & Registration in the Formal Sector					
F1.5	Current varietal release system is not independent from varietal development	F1.5a	Establish an autonomous regulatory entity at the federal level that will also be responsible for conducting varietal evaluation, release, registration, and PVP (Plant Variety Protection)	MoA Directorate	Regulatory
		F1.5b	Develop new and amend existing variety release and registration guidelines detailing steps and processes of varietal evaluation, release and registration	MoA Directorate	Regulatory
F1.6	Current varietal release and registration process has severe capacity constraints	F1.6	Build capacity of the variety evaluation, release, and registry authority	MoA Directorate	Regulatory
F1.7	Post-release duties and rights of the variety owners are not enforced due to capacity constraints	F1.7	Complete revision of Plant Breeders’ Rights Proclamation and draft regulations for immediate implementation	MoA Directorate	Regulatory
Seed Production in the Formal Sector					
F2.1	Seed producers lack capacity for internal quality control	F2.1a	Provide guidelines/standards to enforce internal quality control for all seed producers	MoA Regulatory	
		F2.1b	Enable seed producers to build capacity for internal quality control	RBoA/ESE/RSEs/ Private sector	
F2.2	Seed production volume does not match	F2.2	Strengthen national seed demand estimation and local market	MoA/RBoAs/ESE/	

	farmers' demand due to absence of sound seed demand and distribution mechanism	assessment		
		Intervention F2.6 is also relevant to this bottleneck		
F2.3	Limited availability of early generation seed	F2.3	Increase capacity of breeding institutions to produce higher quantities (linked to Intervention 1.1a)	EIAR/RARIs
F2.4	Lack of market environment reduces incentives to maximize quality and quantity	F2.4a	Delineate and enforce roles and responsibilities among seed producers	MoA/RBoAs
		F2.4b	Support private sector producers to meet needs for commercially attractive crops	MoA/RBoA
F2.5	Inefficient out-grower management by seed producers	F2.5	Develop effective out-grower management by seed producers	ESE/RSEs/Private sector
F2.6a	Delayed seed processing and delivery by seed producers	F2.6a	Support seed producers with sufficient financing and land so that they can scale effectively to satisfy unmet demand	ESE/RSEs/Private sector
F2.6b	Seed producers lack effective commercial (customer-facing) operations	F2.6b	Support seed producers to improve business planning, marketing, and operations management	ESE/RSEs/Private sector

Seed Marketing and Distribution in the Formal Sector

F3.1	Producers lack effective channels to market and distribute their seed	F3.1	Support seed producers to market directly to farmers (Direct Seed Marketing)	MoA/RBoAs
F3.2	Variable quality of seed available at distribution channels due to limited quality control by regulatory bodies	F3.2	Strengthen regulatory structures to improve quality control at distribution	RBoAs Regulatory
F3.3	Marketing agents currently lack the means and incentives to distribute seed effectively	F3.3	Equip marketing agents to distribute seed more efficiently as a viable business	FCA/RBoAs
F3.4	Marketing agents lack incentives to effectively measure demand	F3.4	Enable marketing agents to more actively assess seed demand through direct involvement and incentives	MoA/RBoAs
F3.5	Fixed pricing for public varieties disincentivizes producers and distributors to invest in quality and marketing	F3.5	Implement open pricing mechanism for seed producers of public varieties	MoA/RBoAs
F3.6	Farmers lack input credit to adopt modern varieties of crops with high seeding rate	F3.6	Provide financial services products for farmers to increase input affordability	ESE/RSEs/ Private sector
F3.7	Producers and distributors lack appropriate access to finance, transport, and storage facilities	F3.7	Establish more robust transportation, logistics, and storage systems for seed and better financing for agents	ESE/RSEs/Private sector

The Regulatory System

R.1	Regulatory institutions lack autonomy and role clarity	R.1	Restructure existing federal and regional regulatory entities	MoA/RBoAs Regulatory
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R.2	Regulatory institutions lack capacity	R.2a	Strengthen the capacity of existing seed labs, regional, and federal regulatory bodies	MoA/RBoAs Regulatory
		R.2b	Enhance Field Inspection Capacity	MoA/RBoAs Regulatory
		R.2c	Ensure financial viability / sustainability of regulatory institutions	MoA/RBoAs Regulatory
Seed Production in the Intermediate Sector				
N1.1	Many community-based producers are not operationally or financially sustainable	N1.1	Improve operational efficiency and sustainability of existing CBSPs so that they are able to gradually transition into independent business entities	FCA/RBoAs
N1.2	Lack of adequate access to early generation seed (basic or C1)	N1.2	Improve linkage between CBSPs and research centers which maintain early generation seed	EIAR/RARIs
N1.3a	CBSPs lack capacity to produce sufficient volume of seed to satisfy demand gaps	N1.3	Develop contractual agreements and build operational capabilities of CBSPs to improve quantity of seed	RBoAs/FCA
N1.3b	CBSPs have low seed recovery rates from their member farmers due to poor business planning			
N1.4	Quality of seed produced and supplied by CBSPs often fails to meet minimum quality standards (based on the formal certification process)	N1.4	Promote Quality Declared Seed Regulatory System (QDS) to ensure baseline seed quality	MoA/RBoA Regulatory
Seed Marketing and Distribution in the Intermediate Sector				
N2.1	Lack of adequate and sustainable market for CBSPs	N2.1	Support CBSPs to progressively market their seed using multiple marketing strategies and distribution channels	FCA/RBoAs
N2.2	CBSPs are currently engaged in limited crop and varietal portfolio (# and type of crops and varieties)	N2.2	Effectively link CBSPs with research and conservation institutes through contractual agreements for accessing source seed of diverse crop varieties	FCA/RBoAs
Farmer-based seed / varietal selection and maintenance in the Informal Sector				
I1.1	Farmers may lack adequate knowledge in best seed selection techniques that help maintain genetic uniformity of modern varieties and enhance the performance of existing local varieties	I1.1a	Improve dissemination of best practices in seed / varietal selection and maintenance for the informal sector	RBoAs/ Extension
		I1.1b	Improve linkage between farmers and NARS crop improvement programs through Participatory Plant Breeding and Participatory Varietal Selection schemes	EIAR/RBoAs
I1.2	Germplasm of local crop genetic resources collected by conservation institutes have not been adequately characterized	I1.2	Strengthen pre-breeding component of Ethiopia’s biodiversity conservation institute and promote increased use of indigenous germplasm in breed improvement programs of the NARS	IBC
I1.3	High risk of genetic erosion of local varieties	I1.3	Support the conservation of local genetic diversity by strengthening	IBC

	with the increased adoption of varieties developed through the formal sector		the capacity of community-based conservation institutes to reduce risk of genetic erosion	
Farmer-based grain/seed production in the informal sector				
I2.1	Farmers are currently unable to produce sufficient yield and quantity seeds for preferred varieties	I2.1	Promote application of appropriate agronomic practices that enhance yield and quantity	RBoAs Extension
I2.2	Seed emergency programs are poorly designed and executed, which is especially a problem for the informal sector	I2.2	Set up an efficient National Seed Emergency System that effectively responds to natural/manmade disaster conditions by contributing to seed security	MoA/RBoAs
I2.3	High risk of poor quality seed due to poor cleaning and storage practices	I2.3	Strengthen farmers' awareness in proper seed management methods and improve access to affordable implements	RBoAs Extension
Farmer-based grain/seed marketing and distribution in the informal sector				
I3.1	Limited local seed diffusion and dissemination networks / access points for exchanging / marketing seeds of local cultivars or recycled improved varieties and associated knowledge	I3.1	Strengthen and promote innovative local seed marketing networks for efficient seed diffusion	IBC/WBoAs



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