TRANSFORMING THE ETHIOPIAN SEED SECTOR

Issues and Strategies

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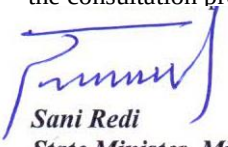
Foreword

A well-developed seed sector is one of the requirements to boost crop production and productivity. Although established four decades ago, the Ethiopian seed sector is still constrained by institutional, organizational, technical, and infrastructural factors; hence, it is not responding satisfactorily to the increasing demand from diverse agro-ecology and farming systems of the country. It is; thus, high time to think of transforming the sector to effectively contribute to the development of Ethiopian agriculture.

Over the last many years, there were different efforts to increase the production and supply of seed to contribute to growth of the agriculture sector. These efforts are characterized by mere piecemeal interventions that have contributed to some changes but have not solved the systemic challenges in the seed sector.

This document is the output of expertise from diverse organizations and validated through stakeholders consultations at several fora. Purposively the document aims at transforming the seed sector. It comprehensively presents the key pillars for seed sector transformation and indicates strategies with respect to transform each of the pillars. For the Ministry of Agriculture and other stakeholders in the seed sector, this is an important document to guide the development and revision of polices and legislative documents. It is also interesting to note that the document is developed when the Ethiopian Government is spearheading agricultural development differently.

The MoA expresses gratitude with thanks all members of the National Seed Advisory Group for preparing the document and all stakeholders engaged in the consultation process.



Sani Redi
State Minister, Ministry of Agriculture

Preface

Even though the Ethiopian formal seed system is steadily growing, its performance is still below expectation, especially in terms of ensuring the availability of quality seed of preferred varieties at the required place, time, and affordable price. Recognizing the importance of establishing a vibrant and pluralistic national seed system, a National Seed System Development Strategy was endorsed in 2017 to guide the sector's development.

By way of ensuring the successful implementation of the strategy, activities including the establishment of a Seed Unit within the Ministry of Agriculture (MoA) and National Seed Advisory Group (NSAG) were lunched. The NSAG members are professionals drawn from different organizations to serve as think-tank to the Ministry regarding seed sector development.

Within the overall framework of national strategy on seed sector development, recommendations that came out of the Regional Seed Core Groups of Amhara, Oromia, SNNPR and Tigray, and the direction given by MoA, the NSAG has been engaged in identifying priority issues that require immediate interventions to ensure transformation of the seed sector.

Accordingly, the NSAG together with the Seed Unit of the MoA developed a document that covers the assessment of the status of the seed sector, and identification of major challenges along with strategic interventions. The main methods employed in preparing this document were framing the concept of national seed sector transformation; assessing the status of the current formal seed sector in line with the seed sector transformation framework; identifying priority challenges for the sector transformation; and identifying strategic interventions and implementing strategies for each priority challenges based on international and national experiences.

The NSAG hopeful that this document will guide and align the efforts of policy makers, development partners and practitioners to ensure the transformation of the national seed sector considering seed production, marketing, services, regulation, revenue generation, and overall coordination of the seed system.

Finally, I would like to acknowledge the Integrated Seed Sector Development (ISSD) Ethiopia Programme for supporting several stakeholders' consultation meetings for the development and the publication of this booklet.

Dawit Alemu (PhD)
Chair of the National Seed Advisory Group

Value Proposition

There is strong purpose, will, and commitment to transform the Ethiopian agriculture. In addition, boosting crop productivity and production is one of the major requirements for agricultural transformation, which entails advancing the seed sector to be competitive and effective in terms of availability, access, quality, adaptability, and market-orientation.

Thus, transforming the Ethiopian seed sector will:

- Contribute significantly to increased productivity: Use of quality seed of improved varieties together with other inputs and good agricultural practices is proven to increase crop productivity. Achieving increased productivity level bridging the current yield gaps would mean better access to food and nutrition security, thereby reducing poverty; and crops import substitution like wheat and malt barley. Moreover, increased productivity would provide surplus products for export markets and industrial raw materials, spurring economic growth, generating more incomes and employment opportunities;
- Encourage private investment (including foreign direct investment) in the seed sector to increase farmers' access to superior crop varieties, and enable access to latest technological innovations and transfer of knowledge of partners towards modernizing the country's seed industry;
- Increase domestic and export seed markets, generating revenue for the country: So far Ethiopia is only importing vegetable seeds, but has a huge potential to benefit from the growing global seed market, which was USD 66.9 billion in 2018 and expected to reach USD 98.1 billion by 2024[1]. Increasing commercial oriented seed production provides an opportunity to exploit both domestic and export seed markets, which also means import substitution for vegetable seeds; and
- Increase efficiency and effectiveness in coordination of the sector and its integration with other sectors.

[1] https://www.imarcgroup.com/prefeasibility-report-seed-processing-plant *(accessed 17June2019)*

1 Introduction

1.1 Background

Seed[2] is an indispensable input in crop production. The use of quality seed of improved varieties contributes up to 50% increase in yield per hectare (Duvick, 2005; Zhao and Zhang, 2005; CGIAR, 2015). Quality seed also triggers the use of other accompanying agricultural inputs such as fertilizers and pesticides (Everson and Gollin, 2003; Agri-Experience, 2012; Abebe and Alemu, 2017). The success of the Green Revolution in Asian countries is mainly attributed to a combination of factors such as the availability of high yielding varieties, access to other complimentary inputs, investments in irrigation schemes), favorable output markets, and enabling policy environments (Minot et al., 2007; AGRA, 2013; Manjunatha et al., 2013;).

In Ethiopia, increase in crop production is mainly attributed to area expansion (40%), indicating the limited role played by other inputs such as seed in the overall performance of crop production. The performance of the seed sector in Ethiopia is far below the desired level, negatively influencing crop productivity (Seyoum, et al., 2011). For sustainable agricultural intensification, the performance of the seed system needs to improve considerably. One major factor for low performance of the seed sector is limited commitment—the lack of ownership to implement endorsed strategies and legal frameworks at all levels of government structures. In addition, lack of role differentiation, lack of accountability, limited capacity across institutions, and a less favorable business and investment environment in the sector are major challenges in the Ethiopian seed sector. As a result, the seed sector development remains stagnant and lacks competitiveness, despite increased volume of seed production.

[2] *Note: Seed in this document carries the definition of seed, given in the Ethiopian Seed Proclamation (No. 782/2013), that it means true botanical seed, bulbs, tubers, cuttings, rhizomes, roots, seedlings or any other plant propagating material intended for planting.*

The Ethiopian strategy of the seed system development (MoA and ATA, 2017) recognizes formal, intermediate, and farmers' seed systems. The farmers' system (non-regulated) is the major seed supplier, the formal system (regulated by different policies and laws) contributes relatively little. The formal system is largely public sector driven across the seed value chain, from breeding to seed distribution. The intermediary system shares some features of both formal and farmers' systems.

Variety development and release have been primarily the role and responsibility of the Government, where more than 85% of the released varieties are publicly owned (MoA and ATA, 2017). All government-owned and domestic private seed producers use varieties developed by public research institutes without paying royalty or having exclusive use rights (MoA and ATA, 2017) although the Plant Breeders' Rights Proclamation exists since 2006, which is revised very recently.

A formal system of seed production started in 1979, with the establishment of the Ethiopian Seed Corporation (Bishaw et al., 2008). In 2018, the total seed supplies of cereals, pulses, and oil crops were estimated at 1,351,000 quintals (MoA, 2018a). To reach the current level, seed production has seen an annual average growth rate of 10.5% since 1995, and 19% since 2004. In spite of this, the supply of seed from formal seed system is less than 20% of the seed used by farmers.

The formal system is dominated by four large parastatal enterprises (Ethiopia, Oromia, Amhara, and South Seed Enterprises) contributing 75% of the total volume of seed of cereals, pulses, and oil seeds. Excluding the Unions, there are only a limited number of private seed producers in Ethiopia whose primary focus is on hybrid maize, for which their current share is about 40% of the total volume of hybrid maize seed produced, slightly higher than their share (35%) in 2011 (ESA, 2018a)

Generally, seed companies are classified as small (producing < 1000 ton); medium (producing 1000-5000 ton) and large (producing >5000 ton) (Bishaw, 2017). By this classification, while the four parastatals and Pioneer Hi-Bred/Ethiopia are large-scale producers, the other

domestic private seed producers are small-scale. Currently there is no medium-scale seed producer in Ethiopia.

There are policy and legal frameworks in terms of variety release, plant variety protection, seed production, certification, marketing, import and export, and sub-continental harmonization. However, in addition to certain policy gaps, operationalization of the existing legal frameworks is still challenging. Formal seed certification started in the early 2000s, and has been decentralized to the Regional States since 2005 (HoPR, 2013). Currently, even though there are 15 seed laboratories including the central laboratory, service delivery are generally is not complaint. Seed marketing has also shifted from a centralized distribution system—with long and inefficient chain—in 2010, to more market-oriented. Currently 60% of field crop seed is marketed directly by produces; while Regional Bureau of Agriculture and Federal Ministry of Agriculture (MoA, 2017a; MoA, 2018b) allocate the remaining 40%.

Seed system operationalization involves strong coordination across stakeholders both internal and external to the agricultural sector, as well as strong leadership and oversight (Sombilla and Quilloy, 2017; MoAAIF, 2015). In principle, these roles should be within the auspices of the MoA. However, ad hoc teams such as the Seed Unit and National Seed Advisory Group (NSAG) at national level and regional seed core groups and seed units at regional level mainly run the coordination.

The purpose of this document is to present the status of the Ethiopian seed sector and its major challenges and strategic solutions to transform the Ethiopian seed sector.

1.2 Concept of Sector Transformation

Previous efforts to support the seed value chain have resulted in 'islands of success' but could not bring 'seas of change' to address the underlying causes for poor performance. Sector transformation demands more than just sustaining increase in production and productivity it requires a fundamental shift in agricultural practices and re-orienting smallholder farmers towards commercial and sustainable production. To realize this, the seed sector transformation is pivotal.

Sector transformation requires a holistic approach beyond interventions in parts of the value chains. It needs creation of structures and mechanisms that support more sustainable change. The concept highlights the need to develop a shared-vision of the desired performance of a sector.

A holistic approach to transforming a sector requires looking into its building blocks. There are six building blocks, as shown in Figure 1. The first three building blocks refer to the transformation of the production base—production, services, and marketing. The other three building blocks refer to the governance of a sector—revenue generation, regulation and coordination. Similarly, Djamen (2016) argues that future public policies and investments can effectively contribute to the sustainable development of the seed sector only if they are directed mainly towards the following six areas:

- implementing more coherent seed policies (regulation block);
- improving the governance of the seed sector (coordination block);
- strengthening seed supply and demand (marketing block);
- improving the performance and responsiveness of research and development schemes (production and service blocks);
- strengthening actors' capacities and facilitating the involvement of youth and women (production and service block); and
- establishing appropriate and sustainable funding mechanisms (revenue generation block).

The accumulation of strategic outcomes of these six areas leads to improved accessibility and use of certified seed to meet demand.

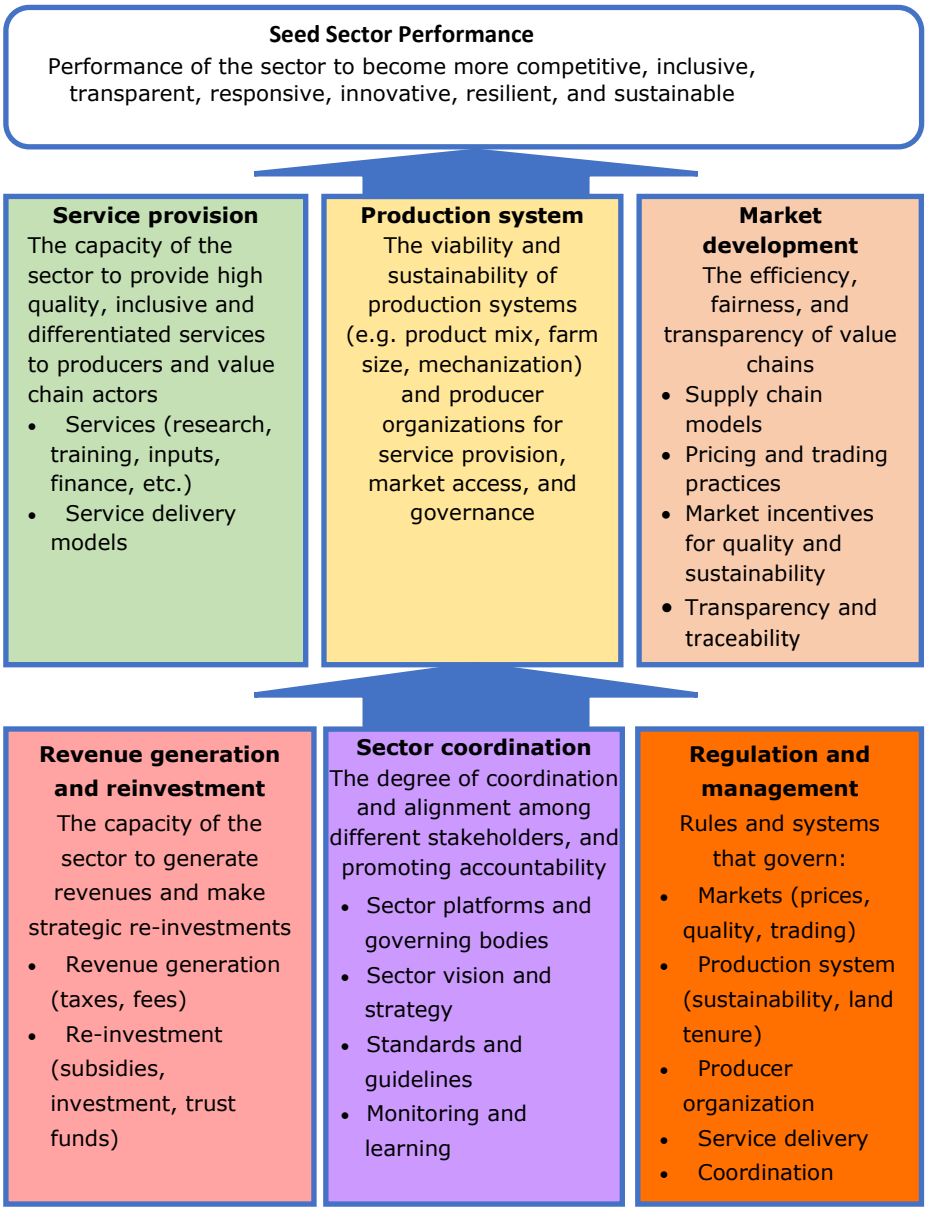


Figure 1. A framework for sector transformation and its building blocks

2 Transforming the Seed Sector

Goal

An efficient, well-regulated dynamic seed system that meets quality standards, adapts to climate change and market conditions, has transparent and inclusive governance, and maintains biodiversity: a system that provides farmers with certified seed of improved varieties of key crops in sufficient quantity and quality, at a required place and time, with affordable price through multiple production and marketing channels.

Vision

The Ethiopian seed sector becomes effective in

- availability, accessibility and use of quality seed;
- domestic and international market competition;
- transparency and inclusivity of its governance system;
- its innovation and speed of response;
- enabling its regulatory environment;
- its sustainability; and
- improving farmers' livelihoods.

As indicated in the above figure, the seed sector transformation has six building blocks that need to be considered simultaneously. There have been several efforts to improve the performance of the Ethiopian seed sector. The results of these efforts need to be consolidated into the appropriate building blocks and reshaped, so that together they transform the seed sector. Achievements, challenges, goals, and strategies for each transformation block are presented in the following sections.

2.1 Production System

Parastatal enterprises and small-scale private producers, including farmer cooperative unions and primary cooperatives, handle seed production in Ethiopia. The four large parastatal enterprises [Ethiopian Seed Enterprise (ESE), Oromia Seed Enterprise (OSE), Amhara Seed Enterprise (ASE), and South Seed Enterprise (SSE)] supply 75% of cereals, pulses, and oil crops. The total of certified seed production in

2018 was 1.35 million quintals, 44% of the target in the GTP (3.05 million quintals). Maize and wheat comprised 86% of this total while their area coverage was 30.17% only.

Seed is produced by individually owned farm and out-grower schemes. Production is largely supply-driven, even for those small-scale domestic private seed producers who currently sell their seed directly (MoA, 2018b). Given the subsistence nature of agriculture in Ethiopia, seed production is geared towards meeting the needs of subsistence agriculture and is not well linked with current government strategies (Agricultural Commercialization Cluster (ACC), export market and agro-industrial parks) for agricultural commercialization. Since seed production is largely through out-growers, the production system remains traditional and less mechanized. In addition, management of out-growers schemes with smallholders is challenging in terms of maintaining seed quality, trust, and price setting relative to grain price.[3] The recovery rate from out-growers is often very low (ISSD, 2016).

Public research institutes that are also the major source of Early Generation Seed (EGS) (Atilaw et al., 2017; BMGF/USAID, 2016) own almost all varieties of grain crops. Research institutes, parastatal seed enterprises, mainly produce EGS while private seed producers, primary cooperatives, and cooperative unions produce a small amount.

There is no clarity on the roles and responsibilities in the production and supply of EGS, resulting in a shortage or an excess supply of EGS in terms of availability and accessibility. Moreover, EGS production is not well aligned with certified seed production because of ineffective planning and low market orientation by the public research institutes, resulting in a mismatch between demand and supply. As such, certified seed production is not dictating EGS production. Very recently, attempts have made among producers both at regional and federal levels for joint planning and role differentiation for EGS production and supply.

[3] *Note: In Ethiopia, seed to grain price ratio at the time of planting is low compared to other countries, except for Pioneer Hi-Bred Ethiopia (for hybrid maize the average seed to grain price ratio is 3.4:1 in Ethiopia; 4.5:1 in Kenya; 6:1 in Uganda; and 13.4:1 in Zambia; while for Pioneer Hi-Bred/Ethiopia it is 7.1:1).*

A relatively small number of varieties dominate seed production, and the rates of varietal change[4] as well as seed replacement[5][6] are low. Of the 1198 varieties released (MoA, 2017c) only 10% (mainly wheat and maize) are commercially produced. With few exceptions, the seed producers in Ethiopia do not have the capacity to supply enough seed to farmers and cannot withstand shocks that may arise from market, production, competition, and globalization. The capacity of the four parastatal seed enterprises is also limited by a physical infrastructure that has little contribution towards building resilience to shocks.

There have been some efforts by the government towards addressing these issues, including creating functional partnership with CGIARs for variety development; providing technical capacity building to research institutes; providing land on a lease base; and giving tax exemptions to seed businesses when they have obtained a license; i.e., duty free import of farm machineries and tax holidays on income tax. The Government also encourages out-growing schemes for seed producers through training, technical support in clustering fields, and agronomic advice to farmers, and recently developed policy for contract farming. In collaboration with development partners, some research centers and public seed enterprises were equipped with irrigation facilities, farm machineries, and seed laboratory facilities.

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[4] Note: Varietal change is the practice of replacing one variety (old) with another variety (new) of the same crop, and is the principal cause for seed demand. Varietal change is the leading reason for high demand for self- and open-pollinated varieties, as well as clonally propagated crop varieties.

[5] Note: Seed replacement rate (SSR) refers to the purchase of new seed of the same variety in response to the deterioration of the seed over cropping seasons. The SSR is often influenced by the mode of pollination (much shorter for open-pollinated than for self-pollinated crop varieties) and also the level of desired productivity by the government. For self-, open-pollinated and hybrid varieties, respectively, at least 25%, 35% and 100% of the area need to be planted to certified seed level.

[6] Note: Nepal launched its National Seed Vision 2013-2025 to improve food security by increasing its domestic production of high quality seeds, and making them available and affordable to farmers. The seed replacement rate, or the percentage of area using certified quality seeds rather than farm saved seed, is set to increase up to 30% for cereal crops and over 90% for vegetables.

In spite of all these efforts, quality seed production remains a challenge to the Ethiopian seed sector development (MoA and ATA, 2017; MoA, 2018c). Some of the reasons for failing to transform the production system are discussed below.

1. Limited availability of crops and varieties for EGS production

- The failure to put in place a coordination system that governs quality EGS production and accountability, as laid down by the mandate given by different legal frameworks, is a major challenge. The proposed solution designed to bring accountability—contract-based production—has been delayed for years because of the lack of commitment by contracting parties and to enforce the contract by concerned stakeholders. For instance, a given EGS producer or recipient company will not be accountable if the former does not produce the agreed-upon amount and quality, or if the latter does not collect, the amount produced; and
- There is a lack of planned promotion and commercialization of available public varieties as an alternative to existing well-adopted varieties to address the diverse agro-ecology of the country to increase variety choices.

2. The lack of a market-driven seed production system

- The Government does not consider seed as a marketable commodity and does not develop yet full trust on private producers, which may be related to a number of reasons including unethical behavior of few domestic private producers and their low capacity to respond to market demand. It could also extend to the frame used and perception of private sector for more than four decades in Ethiopia;
- There is a general concern of monopoly of the seed sector in the future, particularly by foreign companies. Thus, seed has been considered as strategic input and remains under the grip of the government. As a result, there is a high dependency of local producers on public support;
- Inefficient out-growers' management system;
- Failure to select trustworthy farmers due to the influence of the *Woreda* office of agriculture and the dependency of the seed companies on public structure to select and manage out-growers are two key reasons for the inefficient out-grower management system. There is also an undeniable weakness of seed companies in supervising the seed production fields for quality and timely collection of seed for processing and marketing (ISSD, 2016). This is because of the symbiotic relation between seed producers and the office of agriculture, manifested in the form of rent-seeking practices; and

- Seed producers' lack of access to finance to purchase harvested seed on time, particularly when produced by out-grower schemes.

Small domestic private producers do not get credit to purchase raw seed, since there is neither a credit system tailored for seed production nor a government guarantee (this guarantee is given to unions and state-owned seed enterprises). Except for hybrid maize, the price of raw seed is fixed based on grain price during harvest, while farmers always prefer to sell later at peak sale period for a better price, leading to a greater number of defaulters. Although there is no legal ground that fixes the price of raw seed, the amount—commonly 15% above the grain price—is negatively affecting seed recovery from out growers (ISSD, 2016), and seed companies are reluctant to change the percentage. Moreover, the production contract lacks trust and a legal basis, which limits the enforcement of contracts in cases of dispute.

3. Limited capacity for seed production

Full-fledged investment by Regional and Federal Governments is needed to sustainably and timeously fulfill the infrastructure and facilities required to produce sufficiently the planned quality seed. But this is limited.

- The Government does not recognize private seed producers as key role-players in developing the seed sector, so it provides no support to strengthen their production or processing capacities.
- Local administration does not yet understand or recognize its responsibility to protect investment in seed business. For instance, the capacity of producers is constrained by the failure of administrations to secure land or farms for research.

4. Limited commercialization (Kugbei, 2003) [7] and limited adoption of released varieties

- Local companies do not have exclusive user rights on public varieties[8]. The Proclamation on plant variety protection was not implemented since the first proclamation in 2006, because of government disinterest.

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[7] Note: A commercially oriented seed industry brings more efficiency in its overall operation and varieties into the market place as well and establishes stronger links with customers, i.e., seed users.

[8] Note: India allows exclusive rights over public varieties upon payment of royalties to promote effective commercialization of such varieties.

- Plant breeding in Ethiopia is part of public service, so there is no internal motivation to be competent and release outstanding niche varieties for different uses (food and nutrition security, agro-industrial input, or export). Moreover, there is little investment in improving modern breeding capacities[9] or in developing demand-driven outstanding varieties. Thus, out of a thousand varieties released by the public research system, only 10% are under formal seed production (MoA and ATA, 2017).

International experiences and lessons on seed production system

Nearly all countries with well-performing agricultural production have many seed companies ranging from small (producing less than 1000 tons/annum), medium (producing 1000-5000 tons) to large (producing more than 5000 tons of seed). Companies can be either parastatal or private and operate nationally or internationally. There are also farmers' cooperatives and/or associations. Some of the companies have their own plant breeding programs to develop and release their own varieties.

- India has multiple public and private seed companies. In 2019 the country has over 500 well organized private seed companies, both domestic and international[10]. Most international companies are developing their own varieties and some domestic companies enjoy exclusive user rights over public varieties upon payment of royalties. More interestingly, the parastatal seed enterprises focus on seed production of low value/ high volume crops and staple food crops, while private seed companies focus on seed production of high value/ low volume crops, such as hybrid varieties, vegetables and industrial crops (Vkoundinya and Kumar, 2014).
- Kenya has over 130 seed companies; some of these (including the Kenya Seed Company) develop their own varieties (Agriexperience, 2012; TASAI, 2016).
- Uganda has more than 23 seed companies and a number of small seed producers. Almost all seed production and supply is accomplished by domestic and international seed companies (MoAAIF, 2015; ISSD Africa, 2012).

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[9] *Note: Modernizing plant breeding programs is essential to develop and release outstanding varieties that can widely adopted in a relatively short period of time. The widespread adoption of Quncho tef variety is a good example; this was developed through a collaborative project between the Debre Zeit Agricultural Research Center and the McKnight Foundation.*

[10] *https://seednet.gov.in/Material/IndianSeedSector.htm#Role%20of%20Public%20&%20Private%20Seed%20Sector (referred 6June 2019).*

- Bangladesh has more than 300 seed companies (Kolady and Awal, 2018). Its 1993 seed policy reform focused on promoting private seed enterprises for seed marketing and distribution, and facilitating seed imports into the country.

Table 1. P Land under certified seed (C1) for selected crops in some countries

Country	% area under C1 seed	
	Hybrid maize	Wheat
Ethiopia	53	22
Kenya	73	
Uganda	35	
Zambia[11]	110	
India[12]		31-91

National experience

Seed producing companies are more efficient when they are market-oriented. For instance, compared to other Ethiopian seed producers (both parastatal and private), Pioneer Hi-Bred/Ethiopia

- is efficient and effective in its execution of planned activity, which is itself based on a clear business plan;
- has better product quality;
- has well-targeted products based on agro-ecology;
- actively promotes products relevant to a given agro-ecology; and
- Has a strong customer relationship with out-growers and seed users, including good complaint management.

Key lessons

In these countries there has been increased public investment in research (development and infrastructure), and the creation of an enabling policy environment for entry of private sector, with full commitment to regulatory frameworks and policy implementation. This has led to an increasing number of seed companies and an increase in volume of seed production and supply.

[11] *Zambia exports hybrid maize seed; therefore the percentage is over 100*

[12] *The percentage depends on individual states of India*

Based on lessons learned from national and international experiences, the following goals have been set and strategies developed to enhance the seed production system.

Goals

- Efficiency and effectiveness of seed production enhanced
- Improved functioning of the production system with multiple operators in seed production targeting the private sector, ensuring their increased involvement; and
- Increased seed production of those crop varieties that have less commercial interest from parastatals and private seed producers.

Strategies

- Attract more producers to the seed production business:
  - attract more private seed producers through incentive schemes including partial privatization of existing parastatal seed enterprises;
  - define procedures by which international seed companies invest in Ethiopia to attract foreign direct investment (FDI);
  - encourage Ethiopian professionals, supporting them to enter the business of seed production and variety development; and
  - promote forage seed production and small-scale seed producers in agro-pastoral and pastoral areas
- Subsidize[13] the production of seed of strategic crops that are not profitable for producers, for instance grain legumes.
- Support variety development:
  - increase public investment in researching the development of outstanding varieties; and
  - support the development of varieties by state owned and private seed producers.
- Support the production of EGS:
  - design and implement directives for exclusive user rights over public varieties, and transfer the responsibility of producing EGS to companies;
  - ensure variety owners to undertake regular variety maintenance; and
  - enforce the demand- and contractual- based EGS production system.
- Ensure access to land for seed production:
  - strengthen out-grower schemes including licensing out-growers;
  - recognize the use of out-grower schemes for investment in the seed sector[14];

[13] *Note: Subsidy for seed production of less profitable crops could be achieved by covering the difference between the marginal profit and the grain price. In the Ethiopian context, seed production of such crops could be easily undertaken though public support of seed producer cooperatives, as they have relatively low transaction costs.*

- enforce direct engagement between seed producers and out-growers (without the involvement of the *woreda* office of agriculture); and
- provide incentives for investment in the seed sector through full public capital investment; for example, providing irrigated land with full facilities to seed producers). The flower industry model could be applied to seed.

2.2 Marketing Development

Seed marketing in Ethiopia is largely directed by the government (Benson et al., 2014). It was in 2011 that a new option of marketing, Direct Seed Marketing (DSM), was introduced at pilot level (Astatike et al., 2014; Getahun et al., 2014; Nefo et al., 2014). The pilot was found successful and gradually scaled up to 228 woredas in 2018 (ATA, 2018).

Currently, there are two major seed marketing channels in the country. With the centralized distribution system, seed demands are collected by the office of agriculture and used for the allocation of produced seed. The seed is distributed through cooperatives, and in some regions through the *woreda* office of agriculture. With DSM, producers sell their seed, through agents or their own shops, to farmers in the designated *woredas*. In 2018 60% of the seed is marketed through DSM in proportionally less woredas, while the remaining 40% is distributed, through centralized systems in the four major regions, in proportionally more *woredas*. Currently, in the four regions, 76% of maize seed and 62% of wheat seed is sold through DSM, but in far less woredas compared to the total. The results showed that if access were created, farmers would use more certified seed, which, in turn, will contribute to increased productivity and production.

The seed price set by state seed producers indirectly influences the seed-selling price. The four state owned companies decide the price of all crops and this is communicated to the regional states. All the domestic private seed producers use the same varieties and thus the price decided by state companies govern to some extent the price at which private producers sell their seed. As they are the major seed producers, the parastatals are the price makers, but the fact that the government

[14] *Note: Land should not be a requirement to get an investment license and certificate of competence for seed production, as a seed producer can use seed out-growers.*

endorses the suggested price reduces competition in price setting among the seed producers. This price fixing also influences the price of raw seed and thus the volume of seed recovery.

Changing the seed marketing system is about building trust, which takes time. DSM has been piloted and has achieved commendable results over the last eight years. Compared to 2010, there is good understanding about the concept of seed marketing in Ethiopia; the directive for seed marketing has recently been approved and released. However, standardizing across the regions, there are several challenges for DSM.

- The limited volume of seed produced by domestic small private producers in particular has slowed down expansion of DSM;
- DSM mainly focuses in certain potential areas and a limited number of crops, largely hybrid maize and to certain extent wheat. A narrow product portfolio does not address the diverse agro-ecology and diversity of crop varieties in the country. This is because of limited varieties that suit these diverse and marginal areas, a poor agricultural extension service that lacks awareness of varieties, and low seed demand;
  Though it is important for research and extension system to focus on high potential areas, the 'marginal' areas ought to get the due emphasis they deserve, including agro-pastoral areas.
- Limited information exists on what seed is available and accessible to address some of these seed issues. This is mainly because the Ministry and Bureaus of Agriculture uses a rudimentary data management system and lack ICT assisted system which can be accessed easily by seed actors to make seed available to areas in need;
- Seed promotion[15] is weak because companies use public varieties and there is no interest in investing in promotion;
- It is common to see companies unable to sell seed because of a delay in processing due to lack of access to land for installing processing plants, lack of finance, or the lack of electric power;
- Even though DSM is expanding, and there are an increasing number of agents in rural areas, neither the companies nor the agents are investing in

[15] *Note: Seed promotion can be prompted through active engagement of seed producers in seed marketing and feedback collection, developing and implementing modality for exclusive user rights to public varieties by seed producers, encouraging varietal change through frequent release of outstanding varieties such as hybrids, encouraging frequent seed replacement rates, increasing competition among multiple seed producers and developing well-functioning commodity value chains.*

storage facilities. This is partly related to the low standards set for storage to expand seed marketing; and
- Similarly, the underdeveloped agro-dealer system leaves all marketing risks to the producing companies or to the government.

Centralized seed distribution will continue to be one of the channels for seed dissemination. This also has many challenges:

- Regional Bureaus of Agriculture continue to estimate seed demand and allocate for unions/cooperatives, increasing the inefficiency of the system.;
- Although seed demand is not met, paradoxically, seed is left unsold in the stores of unions and cooperatives, partly because the cooperatives /unions do not own it, both physically and psychologically; and
- Inefficiency also persists because there is complex bureaucracy on the side of the government structure that facilitates the process.

International experiences and lessons

Unlike Ethiopia, international seed marketing and distribution (including promotion) is done directly by seed producers using their own sales personnel, agro-dealers and stockiest:

- Bangladesh has more than 20,000 seed dealers (Kolady and Awel, 2017);
- In Uganda seed distribution is mainly done through agro-dealers, agents and distributors (MoAAIF, 2015);
- In Kenya, seed distribution typically occurs via a chain of distributors: agents (large wholesalers), sub-agents, stockiest (agro-dealers), and sub-stockiest (kiosk and other small vendors who are not agro-dealers, but sell seed in season) (Agriexperience, 2012); and
- In Morocco, both the public (400) and the private sector (100) have over 500 seed sale points where the private sector has the right of access to use the public networks (Bishaw et al, 2019)

National experience

- In Ethiopia, Pioneer Hi-Bred/Ethiopia has a strong marketing force (sales agronomists, woreda focal persons, Pioneer extension person/model farmer and temporary sales forces); it also provides after sale services, including agronomic management and complaint handling (ESA, 2018).

Internationally, seed is not only input but also a commodity that is traded in both domestic and international markets. As a result, large volumes of seed are traded at a significant amount of value in a number of countries. Table 1 shows the volume and value of seed exports by some countries. Likewise, Table 2 presents the volume and value of seed imported by some countries. Ethiopia has no seed exports, only seed imports (for vegetable seed). Many counties like Chile, China, and India allow the production of seed of varieties released elsewhere for export purposes without requiring registration of such varieties.

Table 1: Seed export by volume and value for some countries, 2016

Country	Quantity (metric tons)				Value (USD million)			
	Vegetable crops	flowers	Field crops	Total	Vegetable crops	flowers	Field crops	Total
Brazil	111		53,467	53,578	15		153	168
Chile	1299	23	35,200	36,522	138	11	125	274
China	9175	581	23,500	33,256	113	15	69	197
Egypt			1,800	1,800	1		1	2
India	3544	77	25,556	29,177	48	2	33	83
Kenya			730	730			5	5
Korea	625		500	5,625	52		15	67
Mexico	1133		90,525	91,658	14		151	165
Philippines	790			790	7			7
South Africa	1653		124,00	125,653	33		77	110
Tanzania	66	66	1,017	1,149	6	2	3	11
Thailand	1700			1,700	72		55	127
Turkey	1870	1	19,253	21,124	22	2	57	81
Uganda			55,000	55,000			12	12
Vietnam			4,000	4,000	1		11	12
Zambia			1,500	1,500			25	25

Source: Exports of seed for sowing by country (ISF, 2016); values ≥ USD 1 million are reported

Table 2. Seed import by volume and value for some countries, 2016

Country	Quantity (metric tons)				Value (USD million)			
	Vegetable crops	flowers	Field crops	Total	Vegetable crops	flowers	Field crops	Total
Brazil	875	5	49,915	50,795	72	3	62	137
Chile	231	5	7,233	7,469	24	1	27	52
China	9,665	20		9,685	177	14	127	318
Egypt			2,179	2,179	29		21	50
Ethiopia*	229			229	7			7
India	4,040	29	25,742	29,711	64	9	34	107
Kenya			4,500	4,500			16	16
Korea	2,182	285		2,467	69	7		76
Mexico	2,005	1	32,908	34,914	331	1	130	462
Philippines	1,612			1,612	14		11	25
South Africa	1,474	7	70,225	71,706	37	1	79	117
Tanzania	244			244	3			3
Thailand	1,761	1		1,762	23	1		24
Turkey	1,067	4	25,000	27,071	98	3	66	167
Uganda	457			457	7			7
Vietnam			52,120	52,120			34	34
Zambia	164			164	2			2

Source: Exports of seed for sowing by country (ISF, 2016); values ≥ USD 1 million are reported; note that in 2019 Ethiopia imported 600 metric tons of hybrid maize, with a value of over USD 6000.

In 2018, the Brazilian domestic market was approximately US $4 billion, with emphasis on large crops accounting for 83% of the market, forage crops 11%, and vegetables 6% (Agropages, 2018).

In 2014, the value of domestic market of India was USD 2 billion, while the value of seed exports was USD 83 million. The Indian seed market reached a value of US$ 3.6 billion in 2017 (Research and Markets, 2018).

Key lessons

The engagement of seed companies in seed marketing and the active involvement of a large number of agro-dealers leads to availability of quality seed of preferred improved varieties. Market orientation is the driving force for growth in seed marketing and distribution. The motivation to have a greater share of the market prompts seed promotion, diversification of crop-variety portfolios, product development, and the seeking of new markets. Market orientation also increases the quality of products and services in order to develop and maintain trust and reputation, thereby reducing customer complaints. Continuous feedback on the needs of farmers, consumers, and processors helps to estimate demand and develop new products. Market orientation, coupled with the absence of monopoly (achieved by involving large number of companies and products), would help to stabilize and possibly reduce prices.

Based on lessons learned from national and international experiences, the following goals have been set and strategies developed to make the seed marketing efficient and effective.

Goals

- establishing efficient, market-governed and multiple seed marketing and distribution channels;
- enhancing investment in marketing capacity (both technical and infrastructural); and
- entering the international seed market.

Strategies

- Expand DSM to cover more geographical areas and all crops by encouraging;
  - agent/agro-dealers to penetrate rural areas and actively participate in seed marketing, including collecting demand data, with full accountability for maintaining quality and trust
  - agents/agro-dealers to establish a seed marketing infrastructure;
  - seed producers to actively engage in seed promotion; and
  - seed companies to promote small seed packs[16] that suit variable land holdings
- Support suppliers to open market outlets in marginal areas;
- Encourage the ministry/bureaus to stop endorsing price setups by state-owned companies;
- Increase the demand for quality seed through developing commodity value chains[17] ;
- Align seed businesses with recent public initiatives (agricultural commercialization clusters, agro processing industry parks);
- Promote international seed trade (import/export) by
  - finalizing seed trade harmonization with regional markets to produce varieties that are adaptable in the Common Market for Eastern and Southern Africa (COMESA) countries, including Ethiopia;
  - finalizing the directive on imports of foreign registered varieties for local production for export purposes, to exploit the potential of producing high value crop seed;
  - operationalizing the strategic seed reserve system to ensure a sustainable seed market (to be used both for domestic and export);
  - using Ethiopian embassies/missions to promote the Ethiopian seed sector and to attract foreign direct investment (FDI).

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[16] Note: The African Seed Access Index, seed services to farmers include density of agro-dealers in rural areas and volume of seed sold in small packs relative to total volume of seeds sold by a seed company. Delivering seeds in small packs is particularly important for seeds of grain legumes, for which the average land holding is very small. In Ethiopia, average landholding for cereals ranges from 0.22-0.24 ha/household; grain legumes 0.11-0.27 ha; and for oil crops 0.03-0.24 ha/household, strongly justifying delivering seed in small seed packs.

[17] Note: If viable output markets were established to create demand for crop products, this in turn would provide incentives for farmers to invest in their crop fields with improved seed, fertilizer, and other inputs. As such, those farmers who were rewarded in the output market (through well-developed commodity value chains) for uniform produce, or for particular consumer qualities, would find it worthwhile to rely on a formal seed supply to ensure that their harvest met market standards. A good current example in Ethiopia is the malt barley value chain.

2.3 Service Provision

For seed production and marketing, the most important services include variety release and registration, seed quality assurance (field inspection and testing) and finance.

A national quality assurance system has been established since the early 2000s, latterly decentralized to the regions. The four regions have 14 laboratories with limited capacity. Regional coordinating structures have been established in the Southern Nations, Nationalities, and People's Region (SNNPR), in Amhara, and recently in Oromia. Seed quality is still an issue in Ethiopia (ISSD, 2017), though some progress has been made since the early 2010s. Training in technical capacity development and the process of harmonizing across the regions is underway in different projects. Quality control was mainly limited to certified seed production, but the service has now extended to EGS production in research centers. The National Seed Laboratory in Addis Ababa (NSTL) is now a member of the International Seed Testing Association (ISTA), giving access to external information and support.

The quality assurance services of the regional laboratories are not to the expected level. In spite of the need for logistics (vehicles), infrastructure, and testing facilities, regional states are reluctant to strengthen the laboratories. Regardless of the limited capacity of the public quality assurance system and the growing demand for its services, there has been no attempt to introduce any private quality assurance service.[18] Moreover, there has been no attempt from the government to accredit dependable seed companies, which would reduce the burden on the regulatory system[19] (ATA, 2017).

There is a variety release committee responsible for the evaluation and release of varieties. Its members are predominantly researchers; there is no representation from private or civic organizations/associations (for instance, seed associations, agro-processors, or trade associations). Most

[18]*Note: In countries like Uganda and Zambia, private seed field inspectors and seed laboratories are licensed by the public seed regulatory body to give services.*

[19]*Note: In some countries like South Africa, Zambia, and Uganda reputable seed companies are accredited for quality seed production and supply, reducing the burden on external seed quality control and assurance.*

varieties are from public research institutes, few from private producers (MoA, 2018d). National performance trials for both public and private varieties are managed by the public research system. Private horticultural seed companies state that they have inadequate service, both in the number of varieties accepted for the trials and in management of trials, especially with vegetable varieties. Moreover, although payment policies are in place there is no transparency over how fees are decided. In the case of public varieties, conflict of interest is a major problem as the owners of varieties themselves do the trials and are part of the decision making process in releasing a variety (NSIA, 2001).

Overall, the variety release and registration system lacks independence and impartiality. In other words, the neutrality and inclusiveness of the variety release and registration system of Ethiopia is in doubt (World Bank Group, 2015, 2016). The Ministry, which is responsible for managing the process according to existing seed law, only serves as a secretariat (MoA, 2017a). The existing directorate for plant variety release, protection, and seed quality was to be promoted to authority level to effectively manage and coordinate the seed certification and variety release and registration process. However, the government has not yet endorsed the proposed structure.

In terms of finance, regional states make credit available to unions and state-owned companies, but not to the private sector (MoA, 2018e). Similarly, the insurance service is not well developed for the agriculture sector in general and seed in particular. Like any other agricultural venture, seed production is a risky undertaking, subject to vagaries of climatic; for example, drought and flood, biotic such as diseases and insect pests) and human includingwar, civil conflict, fire, theft. It is imperative, therefore, for seed producers to have crop insurance.

International experiences and lessons

Countries with a developed seed industry, such as Brazil, Egypt, India, Kenya, Uganda, Vietnam, and Zambia, provide efficient services to the seed industry. These include variety registration and release; seed quality assurance and certification (field inspection, seed sampling, seed testing, certification and labeling); licensing seed producers and private

seed inspectors; seed laboratory services; and plant variety protection services. Some of the countries are members of OECD seed schemes and ISTA; and some have ISTA accredited seed testing laboratories, giving companies the confidence to undertake international seed trade.

Key lessons

The provision of an efficient, transparent and accountable service is one of the requirements for the development of a vibrant seed industry. Being a member of ISTA and OECD, and having seed laboratories accredited by ISTA, is necessary for a country to engage in foreign seed trade, especially the export trade.

Based on lessons learned from national and international experiences, the following goals have been set and strategies developed to make the seed sector service efficient and transparent.

Goals

- Ensuring the neutrality[20] and inclusiveness[21]of the variety release and protection system;
- Ensuring a reliable quality assurance across the whole seed value chain; and
- Developing and operationalizing tailored credit and insurance schemes.

Strategies

- Establish a federal seed regulatory authority;
- Finalize approval of the regulation that was submitted to the prime minister's office on the establishment of regulatory authority;
- Promote the directorate responsible for the variety release and protection system; and
- Immediately invest in regulatory capacity:
  - to enhance transport, laboratory facilities and human resources; and

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[20] Note: The neutrality of variety release can be ensured by excluding or limiting the roles of plant breeding institutes (EIAR, RARIs, and universities) and breeders from the national variety release committee (NVRC). This implies that the variety testing for distinctness, uniformity, and stability (DUS) as well as value for cultivation and use (VCU) needs to be done by an independent and impartial body under the Ministry of Agriculture.

[21] Note: Membership of the national variety release committee needs to include stakeholders from public companies, private companies, seed associations, and cooperatives/unions dealing with crop production and trade.

    - to upgrade the national seed laboratory to obtain ISTA accreditation and encourage sustainable membership
- Modernize the delivery of the seed sector service
    - establish a database and an ICT-based service delivery and information exchange;
    - include seed marketing in input voucher systems (including seed aid);
    - outsource the field inspection service to private business service providers; and
    - accredit suitable seed companies for their own seed quality assurance
- Develop tailored finance and insurance schemes to enable seed business investment
    - promote credit, including machinery leasing, to enhance seed businesses; and
    - promote crop insurance schemes for seed businesses
- Promote agricultural service providers including farm machinery, processing services and crop protection services.

2.4 Regulation and Management

It is important to note that Ethiopia ranked 159th out of 190 countries in terms of ease of doing business (World Bank Group, 2018), in which regulation and management plays a critical role. Different policy and legal frameworks[22] (seed law, PBR law, seed regulation, the quality assurance service, directives, certificates of competence (CoC), quality declared seed (QDS), and the tracking of rejected seed) are in place for the smooth functioning of the seed sector. Policy and legal frameworks are implemented but not adequately. Their wider implementation is still under question, partly due to a lack of clarity about the goals and priorities of the seed sector, a low level of commitment and accountability, and limited capacity to translate policy and legal frameworks into action. Ethiopia is using the International Rules for Seed Testing of ISTA for seed sampling and testing, and the OECD seed scheme for seed certification. Moreover, Ethiopia uses the four generation seed classes, i.e., breeder, pre-basic, basic and certified seed. However, Ethiopia is a member of ISTA only and not yet a member of OECD; and none of the seed laboratories are ISTA accredited. The

[22] *A proclamation on Seed # 782/2013, Council of Ministers Regulation on Seed # 375/2016, Council of Ministers Regulation to Determine the Rate of Fee for Seed Competency and Related Services # 361/2015, Quality Declared Seed Directive # 01/2007, Directive for Issuance and Administration of Certificate of Competency # 02/2010, Directive for tracking rejected seed field and lot # 03/2010*

membership of ISTA is obtained through the support of development partners paying the membership fee. Being a member of ISTA and OECD as well as having ISTA-accredited seed laboratories are among the requirements for Ethiopia to enter international seed trade.

Another requirement for entering international seed trade is seed trade harmonization. Though Ethiopia has signed a regional agreement on COMESA seed trade regulation, it has not yet endorsed an implementation plan for seed trade harmonization. Moreover, if Ethiopia is to become a member of the World Trade Organization (WTO), the country needs to apply article 27.3(b) of the agreement on trade related intellectual property rights (TRIPS). While the policy to apply this article is in place, there is no effort to implement it.

The Ministry, regional bureaus, and development partners have been working to create awareness on existing legal frameworks for seed producers, technical experts and legal officers. There have been efforts to identify gaps regarding policies and regulations. In December 2018 the Ministry endorsed directives for seed marketing and one-stop agricultural input shopping. Moreover, the national seed policy and two directives, i.e., import of foreign registered varieties for export purposes,[23] and administration of public varieties has been drafted and is at the stage of being discussed by stakeholders. Amhara Region has developed modality for contract seed production. Seed quality standards both field and laboratory standards have been developed for almost all crops being cultivated in the country.

Major challenges with the implementation of policies and regulatory frameworks include the following

- activities are done on ad hoc basis without reference to the existing legal frameworks within the country;

[23] Note: Several countries (e.g. Brazil, Chile, China, Thailand, and Vietnam) exempt registration of commercial varieties for seed production for 100% re-exports of seeds, especially for vegetables and beans.

- actors, including the ministry and bureaus, are not committed to understanding and implementing seed policies and regulatory frameworks to the desired level; and
- Seed trade harmonization of COMESA regulation is being delayed mainly because of the perception of risks associated with loss of genetic resources as well as the fear of competition from foreign seed companies[24]. These risks can be minimized by giving priority to crop varieties that are not being developed and released to a significant extent nationally, such as vegetables, fruits, floriculture, oil crops; for example, sunflower soybean, and forages. The implementation of COMESA seed trade regulations is important to get access to high yielding varieties released in other COMESA countries as quickly as possible. There are already some examples of getting good varieties from other countries through normal registration. For example, imported malt barley varieties (Grace and Traveler) have been released in Ethiopia, and now they are widely grown in major malt barley growing areas of the country. Similarly, vegetable production in Ethiopia depends on imported seed, whose varieties are registered in the country. Thus, it is high time for Ethiopia to finalize the harmonization of COMESA seed trade regulation to exploit the advantages of varieties released elsewhere.

ISTA membership and laboratory accreditation are not yet on the agenda of the Ministry. There is no clear reason why the Ministry has not yet made the issues its top priority agenda. The process of endorsement and operationalization of seed related directives are often slow, limiting efficiency and effectiveness.

International experiences and lessons

Countries with well-performing seed industries have developed and judiciously implemented their seed policies and seed regulatory frameworks to enable both domestic and international private seed companies. These countries are also known to periodically revise their seed regulatory frameworks to fit with market demands, for instance the harmonization of seed regulations, to promote seed trade internationally.

- India developed and implemented its seed policy in 1988, which heralded a new era of private seed sector development; and allowed the importation of

[24] *Discussion and reflections of meetings within the MoA*

vegetable seed for only two years; thereafter they were produced in-country.

The 1991 economy-wide liberalization identified seed as a high priority industry. Liberalization increased the competitiveness of the Indian seed industry and significantly contributed to research and development in plant breeding, seed science, and technology, and infrastructure development. This resulted in increased seed production in both volume and value in the country and increased seed trade (in both domestic and international markets).

India developed and implemented the Protection of Plant Variety and Farmers Act in 2005, which served as grantee for the private seed sector to invest in seed sector and plant breeding research, which has led to an increase in foreign direct investment, released varieties, and production of breeder seeds.

- In Bangladesh, the national seed policy reform of 1993 attracted private sector participation in the marketing and distribution of publicly developed improved varieties and the importing and distributing of seed. This is unlike the seed policy reform of India, which aimed at developing an active seed sector through strong research and development investment (Kolady and Awal, 2018).

Comparative analysis of the seed policy reforms of Bangladesh and India shows that relying only on imports for quality seed is not a viable strategy for the private sector. Investment in research and development, aimed at developing new crop varieties within the country by the private sector, is critically important to increase the competitiveness and market share of the private sector and technology transfer.

- The Kenya seed industry is one of the strongest in eastern Africa. Kenya developed and implemented its National Seed Policy since 2010, which aims at developing, promoting and regulating a modern competitive seed industry. The Seed and Plant Varieties Act of 2016 comprehensively addresses all legislative issue relating to seed and plant varieties; it also seeks to harmonize with other related and international acts.

- The seed sector is regulated by the Kenya Plant Health Inspectorate Service (KEPHIS). The Seed Traders Association of Kenya (STAK), is a

member of the variety release committee, contributing to neutrality and inclusiveness of the committee. With the implementation of plant variety protection (PVP), foreign direct investment and access to superior seed has been increasing, and consequently Kenya's seed market is growing.

- The seed act of 2006 of Uganda gives provision on variety registration and release; licensing of seed producers and agro-dealers; regulation of seed import and export; and seed quality control and assurance. The Plant Variety Protection Act of 2014 protects varieties and hence incentivizes and rewards private seed companies to develop their own varieties and produce and market seed of protected varieties.

- Zambia put in place its variety and seed act in 1995, and its national seed policy in 1999. It endorsed its plant variety protection (PVP) act in 2007. It established a Seed Control and Certification Institute (SCCI) to lead variety testing, registration, release and protection, contributing to the neutrality of the committee. The institute also deals with the licensing of seed producers, private inspectors, seed samplers, seed analysts and seed labs. The Zambia Seed Trade Association (ZSTA) is a member of the national variety release committee, contributing to the inclusiveness of the committee.

Key lessons

In almost all counties (e.g. Vietnam, South Africa, Kenya, India, South Korea, Canada) that have adopted PVP, the number of protected varieties have increased because of increased direct foreign investment and incentivized private seed sector development. Consequently

- yield has increased (rice, maize and sweet potato in Vietnam; cut flower in Kenya, cabbage in South Korea; maize and wheat in China; fruit trees in South Africa and potato in Canada);
- the seed trade (both domestic and foreign trade) has significantly increased; and
- Direct Foreign Investment (FDI) has increased, contributing to employment and technology transfer.

Caution

It is interesting to note that the more the seed sector is liberalized and market oriented, the more the regulatory framework and structure has to be strengthened to avoid the spread of counterfeit seed in the market.

Based on lessons learned from national and international experiences, the following goals have been set and strategies developed to make the seed sector of Ethiopia well regulated.

Goals

- developing a competitive seed market and pluralistic seed sector model;
- designing and enacting national regulations to enhance seed sector development? and
- harmonizing seed trade to meet COMESA standards and international schemes

Strategies

- approve and effectively implement seed policy, seed law, seed related regulations, directives, guidelines and procedures;
- finalize and implement the seed policy;
- develop regulations and directives for Plant Breeders' Rights (PBR);
- endorse pending draft directives (import of foreign registered varieties for export purposes, administration of public varieties);
- implement effective in-country seed quarantine procedures;
- revoke regulations that require land (Van Mele , 2011)[25][26] for investment in seed business ;
- develop and periodically update legal frameworks to ensure the sustainability, accountability and transparency of seed sector actors;
- develop effective legal frameworks for contractual-based seed production;
- develop emergency and seed aid distribution modality, to minimize its effect on seed sector development[27] ;
- develop legal framework and implementation modality for maintaining seed reserves;
- engage in international seed-related schemes;

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[25] *Note: Evidence from nine African countries shows that private seed companies use their own land, use out-grower schemes, and rent-in land and/or buy land for seed production. Except buying, all these options are possible in Ethiopia. Similarly, Pioneer Hi-Bred Ethiopia does not own land for seed production. Rather, it uses out-grower schemes. Building strong trust and win-win relationships with out-growers is required for successful seed production under an out-growers scheme.*

[26] *Note: Land problems can also be resolved by creating seed villages and clustering.*

[27] *Note: Seed aid/emergency is known to weaken seed system resilience because of delivering unadapted/untested varieties, narrowing the genetic diversity of a locality, and weakening the adaptive behavior of farmers. These limitations can be minimized through the provision of an input voucher system so that the target beneficiaries can access seed from formal and informal seed systems*.

- obtain OECD membership, ISTA membership and accreditation; the Ministry needs to budget for an annual fee; and
- implement the COMESA seed trade harmonization regulation.

2.5 Seed Sector Revenue Generation and Re-investment

The seed sector is becoming a high revenue-generating sector in the country. As the sector grows, the contribution of the sector to revenue generation continues to increase. Currently, the whole value of transactions, just taking the value of certified seed, exceeds 3 billion Birr. There are seed companies and research institutes that generate revenues from sales of EGS. Many public institutions also generate revenue from service provisions; for instance, the research system has been collecting revenues from private companies for national performance trials of varieties. Regulations are in place to collect service fees that are provided by regulatory authorities. For instance, the seed certification authorities have started collecting service fees from field inspections and laboratory testing.

There is great potential for revenue from royalty fees and the licensing of public varieties[28]. As it contributes to government tax collection (through land lease fees and income tax), the sector plays a vital role. Moreover, the sector creates job opportunities for citizens. However, the total national revenue generated (0.1 billion USD), compared to the international seed market value (about 58 billion USD), is very much below the potential of the country. Currently there is no seed export, while in 2016; the value of vegetable seed imports was 7 million USD. However, there is potential to produce vegetable seed for import substitution and export, given Ethiopia's diverse agro-ecology and its proximity to international markets; and companies are sitting on the fence, waiting for a relevant and functional policy environment. In particular, this calls for the endorsement of directives for the import of unregistered varieties for export only, and for an efficient phytosanitary service. There is an opportunity for the development of private plant breeding and seed companies in the future, which could generate a

[28] *Note: some countries like India, Turkey and Vietnam are generating revenue from royalty fees by providing exclusive rights to public varieties*

substantial amount of revenue—as is the case in Uganda, Zambia, South Africa, and Zimbabwe.

Though there is no supportive directive that facilitates the export of seed, the government is providing seed import permits for foreign registered varieties for re-export purposes. The government has been working towards seed sector development, and always indicates that seed is a priority on the agenda. However, it does not envision the contribution of the sector in terms of revenue generation. Seed is mainly considered as an agricultural input to ensure food security, not as a commodity for the import and export market.

International experiences and lessons

Working capital and long-term financing is required to meet seasonal production costs as well as capital investment for research and development, warehousing, processing machinery, vehicles, irrigation structure and other farm equipment. Like any other sector in agriculture, the seed sector is very much overlooked by financial institutions (Jessop, et al., 2012; ISSD Africa, 2017). However, the seed sector can generate revenue in different forms

- As shown in the marketing section, when considering seed as a commodity, the seed sector can generate a substantial amount of revenue through domestic and export marketing of seed;
- The seed sector can generate revenue from the provision of services, including fees for variety testing, inspection and licensing (seed producers, seed field inspectors, seed testing and certification) (Agriexperience, 2012; Miti, et al., 2012);
- Making use of plant variety protection is standard practice for private plant breeding companies, and revenue from royalties constitute the basis of their income (Kotschi, and Wirz, 2015). Certain countries such as India, Turkey, and Vietnam collect royalty fees from public varieties by providing exclusive rights to seed companies;
- Savings and re-investments by seed companies (Kotschi, and Wirz, 2015); van Mele et al., 2011);
- Grants are often provided to seed companies and governments by foundations and development programs, aiming to boost agricultural production and productivity and thereby contribute to food security. For instance, the Program for Africa's Seed Systems (PASS) is an initiative of the Alliance for Green Revolution in Africa (AGRA) that annually gives a

significant amount of grants to seed companies in Africa (AGRA, 2018). PASS aims to improve food security and reduce poverty in Africa by promoting the development of seed delivery systems that allow small-scale farmers to gain access to improved, adapted crop varieties in an equitable and sustainable manner;

- The World Bank often provides loans for seed sector development. In the Ethiopian Seed System Development Project (1995-2001/02), the World Bank extended USD 30 million. Likewise, since 2008 the Africa Entrepreneurship Challenge Fund (AECF) has given 12% of the value of its agribusiness portfolio to seed sector entrepreneurs in the form of grants and soft loans (AECF, 2018);and
- Value chain finance is used particularly when seed out-growers are used in several African countries (ISSD Africa, 2017). Value chain finance refers to financial products and services that flow to or through any point in a value chain that enables investments that increase actors' returns, as well as enabling the growth and competitiveness of the chain. Nepal mandated that its banks allocate 10 percent of their lending – around NPR 1.3 billion ($12.7 million) – to agriculture in 2017.

Key lessons

A vibrant seed sector can generate revenue for its sector through various sources, including seed companies' savings and re-investments, collection of fees and royalty from services given by public sector, grants from development partners and NGOs, loans from finance institutions through collateral and loan guarantees, value chain financing, and the seed trade (both domestic and foreign market).

Goals

- becoming a revenue-generating industry including foreign currency for the country;
- becoming a self-financing industry for investment; for instance, human resource development, infrastructure, and related inputs such as inorganic fertilizers and bio-fertilizers, seed treatment chemicals, and seed inoculants such as rhizobium for grain legumes);
- Expand revenue-generating schemes for institutions engaged in the seed sector. For instance, support agricultural research systems, ESA, and regulatory authorities in expanding their income generation schemes and allowing them to re-invest.

Strategies

Public funding for investment to stimulate the seed business:

- Invest in the seed sector (incentive, logistics and infrastructure, facilities), target increased generation of foreign currency. Select a few outstanding companies for this privilege;
- Invest in infrastructure such as irrigation, power, ICT, strategic storage facilities, logistics and packaging to enhance seed trade both at domestic and export markets;
- Design an end user contribution to fund the sector (breeding and seed production); and
- Strengthen linkage between end users' industries (agro-processors such as millers, bakeries, pastry, breweries, textiles) and the seed value chain so that the industries also contribute to the seed sector development, such as variety development
- Develop MoU between the seed sector actors and industries for selected commodities to promote public private partnership (PPP).

2.6 Seed Sector Coordination

The Ministry of Agriculture and Regional Bureaus of Agriculture are responsible for guiding and coordinating the seed sector at their respective levels. Within the Ministry, the activities of the seed sector are under two state ministers and three directorates. Similarly, in the regions, different directorates and offices deal with seed issues. As such, all do their specific task, with weak coordination, alignment, and integration. The Ethiopian seed sector is at an early growth stage (AGRA, 2013), and is not responding effectively to local demand, let alone in a position to enable competition in the international market. It needs strategic guidance, not only to supply quality seed to the domestic market, but also to compete in the international market and generate foreign currency. However, no single organizational entity has been given the clear mandate (role or responsibility) to coordinate the sector, at either regional or national level.

In the absence of a clear organizational structure that guides and coordinates the seed sector (MoA, 2017d), currently ad hoc teams are established to coordinate and guide the sector. For instance, regional seed core teams (each in Amhara, Oromia, and SNNP Regions), composed of major stakeholders of the seed sector, were organized in mid-2010 and since then have been guiding the seed sector in their respective regions. Similarly, seed units at both regional and federal levels were organized in 2017 (drawn from different organizations),

with the objective of establishing a formal structure within the ministry and the regional bureaus of agriculture.

The National Seed Advisory Group (NSAG) was established in 2017 and reorganized in 2018 to provide effective advice to the Ministry. Meanwhile a national seed platform was established on 21 December 2017, aiming to put in place strategies encouraging policy- and decision-makers to develop the seed sector'

All the above efforts are ad hoc, as they are implemented by teams of professionals from different organizations, and could cease to exist at any time. They are neither legally nor structurally responsible nor accountable for coordination or leadership, and may lack commitment and sustainability. Rather, they make suggestions and recommendations without the legal power to enforce them. Thus, they cannot be a legitimate governing[29] structure of the seed sector; they cannot call upon stakeholders to address existing or emerging challenges.

There has been a much defused seed sector governance in Ethiopia since 2004, when the National Agricultural Input Authority (NAIA) was abolished for reasons not clear enough to most actors in the seed sector. There have been discussions since 2008 about reinstituting the structure of seed sector governance, but there has not been the political will from the ministry to accept the idea (Mohammed 2017).

International experiences and lessons

A number of countries have set up seed coordination bodies: for instance, the National Seed Council of Egypt (Mohammed and Ahmed, 2010); Ghana (Ministry of Agriculture, 2015); Nigeria (National Agricultural Seed Decree 72, 1992); Uganda (National Seed Board of Uganda, part of the Ministry of Agriculture, Animal Industry and Fisheries, 2015); and the National Seed Board of Bangladesh (Kolady and Awal, 2018). In Nepal, the Seed Act made provision for a national seed board with the authority and responsibility to formulate and implement seed-related policies and to give the necessary advice on

[29] *Note: Indeed, the seed sector of Ethiopia is characterized by its weak governance system, resulting in a mixture of roles and a lack of ownership from the multitude of actors and stakeholders.*

seed-related matters to the government (Shrestha, 2016). Many other countries, including Bangladesh (Kolady and Awal, 2018) and Vietnam have seed sector coordination run by their ministries of agriculture (MARD, 2006).

All these seed coordination bodies have the following roles and functions: they

- provide overall coordination and oversight of the performance and development of the seed sector;
- design improved management systems and procedures relating to the administration of seed sector;
- lead, guide and monitor reform and modernization of the seed sector;
- analyze and formulate programs, or revise policies and actions regarding seed industry development (research on issues relating to variety testing, registration and release, seed production, marketing, distribution, quality control and certification, supply and use of seed, seed import, seed export, coordination, management and financing), advising the ministry accordingly;
- develop policies that stimulate development of the seed sector and encourage companies to carry out research, production, processing and marketing of seed in the country, subject to the approval of the Ministry;
- ensure consistent implementation of seed policy and seed regulatory frameworks;
- define clearly the roles and responsibilities of actors and stakeholders to ensure harmonious operation, create synergy, reduce duplication of efforts and optimize resource use, all to be carried out with commitment and accountability;
- foster a better understanding between public and private interests and activities to facilitate cooperation and complementarity; and
- advise the national research system on the changing dynamics of seed demand and farmers' needs based on, for instance, market, climatic and biotic factors to enhance development of farmer-preferred varieties.

The above list, gleaned from experiences of several countries, shows that seed sector governance oversees the implementation of different policies, proposes policy ideas for the development of the seed sector, coordinates activities of different actors, and defines the roles and responsibilities of actors. Improvement of governance is necessary to enable the various actors to play their specific roles and to coordinate

supply and demand. In this context, the role of each stakeholder in the seed sector must be clearly defined in order to better establish responsibilities, reduce duplication of efforts, and create synergies in interventions. Functional dialogue spaces at national and regional levels are needed, particularly for consultation, identification of innovative needs, coherence of interventions and elaborating responses to challenges. Improved communication around legislative and regulatory frameworks is necessary to facilitate ownership and compliance by stakeholders. Resources such as human, finance, material, infrastructure and facility, and the autonomy of services that enforce seed regulations, should all be improved. This will reduce vulnerability and improve efficiency.

It is relevant to consider seed as a strategic agricultural input in crop production and productivity, and as a commodity to generate income through seed trade in domestic and export markets. At the same time, it is important to recognize its current clumsy performance, and the strong need to set up appropriate leadership to guide the development of a vibrant seed sector in Ethiopia.

Key lessons

Many of the countries with advanced seed industries have well-coordinated and well-regulated seed systems. Each entity (either council, board, or agency) leading seed coordination is accountable to or reports to its Ministry of Agriculture. Thus, for Ethiopia to have a vibrant seed sector, it is vital to set up and make operational an entity that coordinates the seed sector at both federal and regional levels.

Based on lessons learned from national and international experiences, the following goals have been set and strategies developed to coordinate, align, and integrate the seed sector of Ethiopia.

Goal

- Ensure that a designated governing body at federal and regional level coordinates all seed issues, which is well staffed with competent, effective and accountable leadership;
- Ensure stakeholders' inclusion and transparency in governance; and

- Ensure that respective mandates, roles and responsibilities of actors in the sector are clearly defined and delineated, each well-functioning at regional and national levels.

Strategy

- Establish seed governance structure at federal and its corresponding entity at regional level, mandated for seed sector leadership and coordination.
- Review and analyze the performance of existing coordinating systems and present it for national dialogue in the presence of pertinent stakeholders/actors from regional states; and
- Establish an agency at national as well as regional level, coordinating structures, and ensuring their linkages, integration, and alignment.

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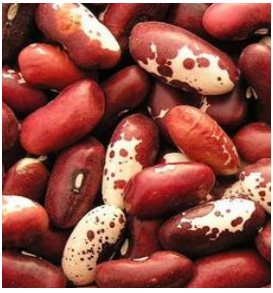

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