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PROSPECT AND CHALLENGES OF PRIVATE SECTORS IN HYBRID MAIZE SEED PRODUCTION AND MARKETING: THE CASE OF SELECTED PRIVATE COMPANIES

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ABSTRACT:*The principal purpose of this research is to identify the prospects & challenges of private sectors in hybrid maize seed production and marketing and suggest practical solutions to improve the efficiency of seed provision in Ethiopia.In this research primary and secondary data collection methods were applied, document reviewed, survey carried on selected seed companies, key informants' interviews and focus group discussion in major regions had been carried out. The research study revealed that policy environment (investment incentives, tax exemption) seed production and quality control (EGS, knowledge and skill, access to land),market and distribution(price, unhealthy competition with public seed enterprises) and inadequate administration support are the key constraints to the private sector.The findings further revealed that the centralized Pubic seed enterprises cannot meet the supply of quality and quantity hybrid maize seed demanded by farmers thus participation of private sector is crucial. The study recommended the need for improvement in the Development of a clear policy and directives on variety development and release, Expand the quality EGS access, reduce seed production constraints, Improve Seed certification and quality control, explore more effective marketing and distribution models,improve Access to capital, Build knowledge and skill of private seed companies.*

Key Words: *Hybrid Maize Seed, Seed Production, Seed Marketing, Seed System, Early Generation*

1. INTRODUCTION

1.1 Background of the study

Ethiopian agriculture contributes 36% to the GDP, 75% export and 80% employment (WB, 2017). Since the 1990s, the Ethiopian government has formulated and implemented the policy framework, known as Agricultural Development Led Industrialization (ADLI), with agriculture as a primary stimulus to increase agricultural output, employment, and income of the people. According to ADLI, the agricultural sector should turn Ethiopia into an industrialized economy (MoFED, 2003). With the introduction of structural reforms and market liberalization in Ethiopia and the change in the agricultural sector, the role of state-owned farms has dramatically declined

and instead the involvement of private investors in agricultural production has increased. Government policy allows and encourages the high involvement of private companies and other entities, including cooperatives, in agricultural production and marketing (Bernard, Abate and Lemma, 2013).

A key priority of the government's Growth and Transformation Plan II (GTP II) is to expand competitiveness in the seed sector and achieve a high increase in seed supply by 2020. The target for improved seed supply is to meet 0.35M tons of certified seed that needs to increase from current production levels by about 0.18M tons. The plan can be achieved if the seed system framework meets the international standard and possibly attract the private sector.

High-quality improved seed is essential to achieving the higher yields necessary to feed the world's population and reduce rural poverty (USAID-EAT project 2015).Improved seed is one of the most important inputs for improving crop production and productivity. Its contribution is high when it is available in demanded quality and quantity at the right time and for the right price (Adetumbi*et al,* 2010; Louwaars and De Boef 2012). The Ethiopia seed system has shown changes during the past three decades but still the sector is unable to guarantee farmers' access to seed of improved varieties, in the right quantity and quality because of the inefficient seed production, lack of good seed policy on key issues such as access to credit for inputs, highly centralized seed distribution system, seed marketing problem and weak linkage and integration among the stakeholders (Abebe, 2010;MoA, 2016).

In the past few years, several significant milestones have been achieved towards building a dynamic, efficient and well-regulated seed system in Ethiopia. The establishment of Regional Seed Enterprises has resulted in an unprecedented increase in the supply of certified seeds in less than five years. The modest growth of the private sector in seed production is contributing towards the sustainability of the seed industry and in reducing the burden on the public.

In Ethiopia, the role of different actors in the seed sector has been clearly undefined. There was an attempt to develop a national seed industry policy for Ethiopia in the early 1990s. However, from the time the national seed industry policy was drafted in 1992, it is not known as to what extent the private sector companies are involved in seed production and marketing and how they

are faring. Still, the public sector plays the greatest role in the system including regulating access to genetic resources, variety development, variety release and registration seed production, seed distribution and marketing. It is also responsible to monitor and regulate seed certification, variety protection and phytosanitary/seed quarantine control. The private sector's engagement in the seed sector is limited only to producing certified cleaning and delivering of Hybrid Maize seed to end users. Some are also engaged in producing basic seeds for their seed multiplication. However, the modest growth of the private sector in seed production is contributing towards the sustainability of the seed industry and in reducing the burden of the public sector.

The sustainable supply of quality seed to farmers is essential enabler to transform the socio-economic development of the country. The county's agricultural transformation strategy emphasizes on the contribution of the seed sector to boost the agricultural production and thus become the focus of the transformation agenda. In this regard, effort that has been made on maize research and extension is a good example.

Maize or corn with scientific name (Zea mays) is one of the most important cereal food crops across Africa. Although type of maize grain is classified into five groups based on the appearance and texture of the kernel dent maize, flint maize and pop kernels are popular in many parts of the world. The average corn kernel contains about 73 percent carbohydrates,9percent protein and 4 percent oil. Because of its high carbohydrate content and relatively low price it is the most widely used energy- concentrated feed for livestock in the world. It is widely eaten in various forms and more than 900 million Africans depend on maize every year because it is often cheaper than rice and wheat (WFO, 2017).

In Ethiopia Maize is one of the most important field crops in terms of area coverage (2.2 million ha) accounting for 15.39% of the total harvested area of annual crops, production and economic importance (CSA2010, CIMMYT and EIAR, 2011). It is largely produced in western, central, southern and eastern parts of the country consumed as "injera", porridge, bread, boiled or roasted as vegetable at green cob stage and to prepare local alcoholic drinks known as "Tella" and "arekie". In addition to the above uses the leaf and stalk are used for animal feed and the dried

stalk and cobs are used for fuel purpose, it is also used as industrial row material for oil and glucose production.

On paper the policy directive encourages the participation of private sector in the seed business, but the government indirectly control the production, marketing and distribution of hybrid maize seed. To this effect, there is therefore need to conduct review that focuses on assessing the performance of the private sector and challenges facing in the national seed systems as this will help determine if the seed policy has achieved its intended purposes of facilitating different activities in the seed systems.

This paper presents an analysis of Ethiopia's private sector challenges in hybrid maize seed production & marketing and identifies practical solutions to improve the efficiency of seed supply in the country and suggest recommendations based on primary & secondary data, focused group discussion and informant interviews.

1.2 Statement of the problem

The government of Ethiopia has allocated a huge money to establish new research canters, federal and regional seed enterprises, modern seed processing plants, Seed health laboratories and huge warehouses so that most farmers will be exposed to quality and quantity seed in their respective areas. As the country has over 13 agro ecological zones it is practically impossible to fulfil the required logistics to all of them with the government infrastructures.

Different actors are engaged in seed supply throughout the country. However, unlike many other countries, the formal seed sector heavily depends on public seed enterprises. There is a low participation and contribution by private seed companies. The private sector is receiving very little or negligible support from the government in allocation of suitable land for hybrid maize seed production, allocation of early generation seed, timely inspection and certification, credit support, marketing and distribution etc.

Though both domestic and foreign private companies contribute to the growth and development of the country seed industry the few private sectors involved in hybrid maize seed production is facing a lot of challenges and couldn’t contribute as expected. With the current agricultural

growth program of the country, there is a need to strengthen and support private seed firms to be competitive in the seed business Concerned government body is expected to positively respond to the problems of the private sector so that the supply of seed can grow on sustainable manner.

Consequently, the main objective of the study is to examine the major challenges of private sector in the production and marketing of Hybrid Maize seed from variety development and release to production- certification to marketing and distribution and understand its effect on smallholders' access to improved Maize hybrid seed and finally, suggest possible recommendation to government, concerned stakeholders and seed companies to address the private sector issues that support private seed sector investment in the country . More specifically the study aims to:

- Identify, prioritize, and analyse key seed production, marketing and distribution, and related regulatory and institutional bottlenecks that constrain the development of the private seed sector in country
- Identify alternative solutions to address the bottlenecks

2. LITERATURE REVIEW

2.1 Ethiopian Seed System

The seed system in Ethiopia refers to the full set of activities and stakeholders involved in effectively developing, producing, and distributing quality seed at the right quantity and the right place mainly to smallholderfarmers and other users.

The seed system in Ethiopia consists of formal and informal (farmer-saved and farmer based) seed systems. There is also an intermediary (semi-informal) position, between formal and informal systems. Intermediary seed system combines attributes of both the formal and the informal seed systems (Hassena and Dessalegn, 2011).The seed system development strategy hasalso recognized the three seed systems in the Ethiopian seed sector: formal, informal, and intermediary (MoANR, 2016).Each seed system has a specific contribution to the delivery of seed to farmers, but they vary in their approach and respective strategies. The major players

involved in the production of seed in the formal system arePublic Seed Enterprises, Cooperatives and licensed private seed companies.

Although much progress has been made in recent years, the Ethiopian seed sector remains less diverse where the public sector dominates and the choice for seed supply is limited to few major crops.The Ethiopia seed system has shown changes during the past three decades but still the sector is unable to guarantee farmers' access to hybrid maize seed, in the right quantity and quality because of the inefficient seed production, lack of good seed policy on key issues such as access to credit for inputs, highly centralized seed distribution system, seed marketing problem and weak linkage and integration among the stakeholders .

2.2 Formal Seed System

The formal seed system in the Ethiopian context is a system that involves a chain of activities leading to certified seed of released varieties (Louwaars,2007).The formal seed system is mainly government supported system and several public institutions are also involved on it. The major actors of the formal system are: Ethiopian Agricultural Research Institute (EARI), Ministry of Agriculture and Livestock Development (MoALD), Federal and regional Seed Enterprise (RSE) although some private enterprises (domestic and International) are now entering the seed industry and have started producing and marketing improved seeds mainly maize hybrids (Abdisa*et al*, 2001). Out of 34 domestic and MNC registered seed companies 31 of them produce and supply hybrid maize seed while the remaining produce open pollinated and other cereals.

2.3 Informal Seed System

The informal seed system, (sometimes called as local seed system) under Ethiopian context is defined as seed production and distribution along with the different actors where there is no legal certification in the process. This includes retained seed by farmers, farmer-to-farm seed exchange, cooperative based seed multiplication and distribution, NGO based seed multiplication and distribution etc. There is also community based seed production which is largely in informal seed system seed where farmers are organizing into groups and involved in the seed production, hence its production do not go through the formal certification of seed (Hassen and Lemma,

2010).In maize growing areas the Informal seed system mainly produce open pollinated maize varieties.

2.4 Varietal Development, Release and Registration

According to Ministry of Agriculture Ethiopian Institute of Agricultural Research (EIAR) has a national mandate to develop and conducts variety evaluation. An average of 50 on-station maize trials is conducted annually. Before new varieties can be registered, they must be evaluated in the regional or national trials for three seasons across three to five locations. The new varieties must be distinct and agronomical superior to the check by more than one characteristic. The DUS data should have a complete morphological description of the candidate variety. The National Variety Release Committee (NVRC), which is under the MOALDevaluate candidate varieties of various crops for release.

The NVRC is responsible for scrutinizing and approving the release of new varieties based on the data submitted. The NVRC is assisted by a technical committee that evaluates trial data, undertakes field inspections, and makes recommendations to the NVRC, who are responsible for the final decision on whether to release a variety or not.

The release process is slow as it allows only three varieties per ecology to be submitted for release by a given seed company. If a seed company wants to release more than three varieties per ecology, it has to wait for the following season. There is no locally organized private breeding company in Ethiopia.

2.5 Source seed and basic seed Production

The public sector (NARS, ESE, RSE, HLI) is the primary producer of basic maize seed of public varieties (although Pioneer Hi-Bred Seeds Ethiopia & Seed Co produces forits own use) but it produces insufficient quantities to satisfy demand, as a result private seed growers face a shortage of quality basic seed almost every year. This was caused by insufficient planning or market mechanisms to estimate for increased seed demand, along with the limited land allocated for basic seed production**.**

Recent improvements, including the licensing of research institutes and two private seed companies to produce basic seed for the popular hybrid maize varieties, are a step in the right direction; however, more must be done. Without a consistent supply, seed growers cannot plan their production or build a reliable customer base, The Quality of basic seed supplied to the private sector is also a major concern.

2.6 Certified Seed production

Although private sector focus mainly on certified Maize seed production the major players of certified seed production for major crops including hybrid Maize seed are Public seed enterprises.The role of private sector in certified seed delivery is limited both in scope and scale of seed supplied. 'Pioneer Hi-Bred seeds Ethiopia plc'has started seed operation in 1990 and was the only private seed provider in the country until the emergence of a number of small to medium domestic private seed companies in 2000s. From 1998-2008, based on available data, the private sector on average provided about 1,388 tons of primarily maize hybrid seed which is about 21% of total maize seed supply or 9% of total formal seed supply across all crops (Negari and Admasu, 2011). However, its share of hybrid sales increased from a little more than 500 tons in 1996 to nearly 10,000 tons in 2016 (MoANR, 2017).

According to MoALR(2017) certified seed supply report there is substantial increase in the amount of certified seed supply in recent years. In 2016/17 crop season maize seedsupplied by the federal and regional public seed enterprises was 17251.9 tons (54%), PioneerHi-Bred Ethiopia supplied 9,042tons (28%), domesticseed companies 3,940.56 tons (12.4%)and farmers' cooperative unions17,939(5.6%), of maize seed. The total share of private sector on hybrid maize is 40.53% of all maize certified seed supply in the country.

Taking into account the potential seed demand of the country and the recommended seed replacement rates, the overall performance of the formal sector appears satisfactory for some crops than for others, for cereals which includes Maize the certified seed supply reached 26.2% seed replacement rateand 4.36 %for pulses and 1.06% for oil crops.

2.7 Contract Seed Production Agreement and Its Challenges

Most of the public and private seed companies do not own enough land except OSE for certified seed production except OSE. They are using organized farmers' seed producers, cooperative unions or large scale private farms on out grower scheme. Out growers take responsibility of all the farm activities and supply of agric. input except the parent seed is supplied by the owner, payment and all terms and condition are included on the contract agreement which is signed by both parties at the beginning of the season. Field inspection is done by regional MOA offices.

The current contractual agreement system is bindingby law and if one of the parties break the agreement there is no a system to interrogate them. Therefore, contracts need to be backed up by law and by an efficient legal system. Existing agreements may have to be reviewed to ensure that they do not constrain seed business and contract farming development and to minimize red tape.

2.8 Seed Certification and Quality Control

Seed Certification ensures the acceptable standards of seed viability, vigor, purity and seed health. Unlike many countries in the world, the seed certification system in the country is compulsory for all crops including maize hybrid seeds and all are certified by government regulatory body at federal and national regional states level. Since farmers have difficulty assessing the physical or genetic qualities of seeds beforeplanting, certification of seed quality is essential to provide farmers with quality assurance and a means of redress if expectations are not met. In Ethiopia, federal and regional MoALDprovide seed certification and quality control. The processes require documents regarding the source seed, inspections of seed production plot during the growing season, and physical tests of seed after harvest.

According to African Seed Access Index (TASAI, 2017),there are 32 public seed inspectors in Ethiopia. In addition, several private seed companies have their own seed inspectors, though they are not licensed by the government.The role of the in-house inspectors is to monitor their company's seed quality and obtain quality assurance from the public inspectors of the Bureaus and Ministry of Agriculture and livestock Resources. Given the large size of Ethiopia and the wide distribution of seed producing regions,the number of inspectors is low compared to other

countries covered by TASAI. Seed companies rate their satisfaction with the availability of seed inspection servicesas good as 68%.

2.9 Marketing of seed in the formal sector

In Ethiopia, seed marketing is highly centralized and regulated by the government through Inputs Marketing Directorate (IMD) of the MOANR at the federal level and the Input Marketing Processes of regional BoAs (Alemu and Bishaw, 2016).The key market actors are the public seed enterprises as suppliers and the cooperative unions and their respective primary cooperatives as distributors. The Ethiopian formal seed sub-sector annual seed selling value transaction is estimated to be more than ETB 2 billion. Seed demand is assessed strongly through government channels and is characterized by its mismatch with actual seed supply that leads to shortage and/or surplus supply at different times (MoANR, 2017).

There are many actors involved in seed marketing and distribution and the interrelated activities at the marketing stage are seed quality verification, price setting, storage, transport, cleaning and distribution which require special attention and resources. The unions are responsible for marketing (buying, assembly, transport, cleaning, packaging, storing and distribution) of seed (Fikre et al, 2010: Dawit and Tripp, 2010).

Out of 34 companies (1 multinational 1 regional and 32domestic seed companies) licensed to produce and market seed in the country, Pioneer HI bred Seeds Ethiopia has been distributing its hybrid maize seedthrough individualdealership distribution channels almost since its establishment.

2.10 Distribution channels

The Supply of high quality seed of improved crop varieties preferred by farmers, in sufficient quantities, in a timely manner, to accessible locations, and at affordable prices is a national development objective pursued by the Ethiopian government to secure food supply for the nation.

According to MOA, Traditionally the formal Seed distribution and marketing mechanism has been carried out through government agricultural extension channels, but since recently it is

distributed through cooperative, individual dealers and direct seed marketing which started as pilot program in 2013 and scaled up gradually to new districts. Since all seed producers are supplying their seedto village level through selected agents, farmers are benefiting in terms of timely availability of seed, time saving in traveling to get the seed, choice of varieties and packages, quality, price, services etc.

2.11 The Seed price

The seed price for public seed producing companies is determined by federal and regional seed enterprises joint meeting which is conducting once in four months on a rotational basis. After the decision is made each enterprise will report the price to its respective board of directors for approval, without any changes. The set price is communicated to the key stakeholders and will be used accordingly. The overall direction in price setting is to sell the certified seed at the same price throughout the country, while taking into account the differences due to overhead, transportation and handling costs. Since public and domestic seed companies are producing and supplying the same varieties of maize hybrid seeds domestic private companies use this price as a bench mark, However, the multinational seed companies such as Pioneer set their own certified seed price with minimal external interference based on market forces.

The consequences of such price controls and price ceilings of this nature that fix prices below market equilibrium are entirely predictable. They lead to shortages in supply, disincentives for private investors to enter the market, and encourage rent seeking and the development of black markets (Rashid *et al* 2009; Worku*et al*, 2011).

2.12 Access to Loan Provision

The private sector in the seed industry requires substantial capital investment, especially for seed cleaning machines and warehouses otherwise it will affect quality of seed supplied to farmers. Unfortunately, there is no clear guideline from government in credit facilitation for this sector.This is emphasizing the need for a general policy environment that creates incentives for investment in the seed sector.

2.13 Private Sector Contribution

In a country like Ethiopia where diversified crops cultivated in different agro-ecologies and farming system it is difficult to satisfy the requirements of smallholders with a single seed supply chain. Therefore, integrated seed supply sources namely public, private and community based organization are expected to play role. Given a favorable policy environment, the private sector can play a pivotal role in developing the seed systems. The private sector can help bridge the gap in supply of high value crops seed that has been left by the government supported activities.

According to MoALD(2017)out of the total hybrid maize seed supplied about 40% is from private sector, private sector in seed production has contributed for creating job opportunity to the community. More over Private sector has introduced seed technology skill to majority of Ethiopians.Contribution of private sector to the total seed production is still only 9%, but when it comes to maize, the proportion is about 40%. Thus, private companies are very much skewed to hybrid maize seed production, obviously related to the benefit. The bulk of this supply is by Pioneer Hi -bred seeds Ethiopia, who is increasing its production steadily, while that of local private companies is not increasing proportionally. The introduction of seed marketing might have challenged the companies indicating their low competitive capacity in the market. Although there are external factors that contribute to their low contribution, their internal capacity and enthusiasm to increase their market share is also important. Thus, local private seed companies need to work hard to increase their market share.

4.2 2.14Policy and regulatory framework

In Ethiopia,there are seed policy, law, regulation and different directives and guide lines developed, however, it is important to improve the policy environment that hinders private sector participation in seed business. The main ones are inadequate market system, inadequate support of the government to the private sector, lack of investment incentives, inadequate policy implementation and enforcement at all level and inadequate access to public owned varieties of EGS. This is confirmed by key informants responding and literature review that in the country there is no clear policy direction on the role of private sector in seed industry development and investment. Some governments in Asia and Africa gradually withdrew from seed production

empowered private seed companies and fully liberalized the seed sector while others allowed joint venture investment with foreign companies. These changes engendered institutional transformation and resulted in significant development of the agricultural sector.

Experience of countries like Bangladesh, Turkey, India and Kenya shows that When governments began a series of reforms aimed at opening the seed industry to the private sector, including simplified business registration requirements, automatic and free variety registration, and truth-in-labeling rules in lieu of seed certification lift price controls and restrictions on company and dealer registration the number of seed companies ballooned in all countries seed yield grew from 1mt/ha to 6mt/ha and income of farmers also grew accordingly. The agro dealer network in Bangladesh today averages one retail shop per 1,000 farmers, plus an additional 50,000 mobile vendors. By contrast, countries in Sub-Saharan Africa with more restrictive policies have a mean of only 3 agro dealers per 10,000 farms. Source: USAID-AGP-AMDe Project (2013), 2 World Bank, Agribusiness Indicators: Synthesis Report, Agriculture Global Practice Discussion Paper 01 2014).

3. RESEARCH METHODS

The principal aim of this research is to explore the private sectors in hybrid maize seed production, marketing and distribution to determine its responsiveness and efficiency in meeting the demand. This can be so by looking in to the extent of the certified hybrid maize seed production, processing, quality control, marketing and distribution. Thus, it incorporates descriptive research design as well as both quantitative and qualitative approaches in all its phases.

Private sectors in hybrid maize seed production and marketing research draws multiple quantitative and qualitative data from various sources that can be categorized in to primary and secondary primary data sources and units of analysis for the research were the actors and stakeholders in the private certified hybrid maize seed business.Secondary data for this study was obtained from appropriate sources.A total of four methods were used such as document review, private seed sector survey, key informant interview, focus group discussion at federal, Oromia, Amhara, &SNNPR regions and Data source targets were selected a broad range of stakeholders

who were involved in the value chain of formal seed system. Specifically, primary survey was conducted on 21 private seed companies (domestic and international) who are member of Ethiopian Seed Association located at Federal, Amhara, Oromia, SNNPR and Tigray Regions.While a total of 12 Key Informant Interviews was conducted at various levels. The informants were purposively selected from the offices of MOALD, EIAR, ESE, ATA, ISSD Ethiopia, Amhara, Oromia and SNNPR regional states. In addition, **r**elevant documents (policies, laws, regulations, directives, journals etc.) were reviewed to collect information.

4. RESULTS AND DISCUSSIONS

4.1.Company profiles

4.1.1Company's Location Twenty-six private seed companies are the members of Ethiopian Seed Association. Out of the total registered companies twenty-one (80.8%) were identified for sampling, of these 33.3% of them were located in Amhara, 28.6% in Oromia, 14.3% each in Addis Ababa and SNNPR, while 9.5% of them were in Tigray regions. More than 75% of the companies are located in Amhara, Oromia, and SNNPR regions that the areas are suitable and potential for agricultural production (Table 1). Public sector in Amhara Region is not strong and has given opportunity for private sector to better flourish while in Oromia region public seed enterprise is strong.

Table 1: Company's Location

Name of region	Count	Percent
Addis Ababa	3	14.3
Amhara	7	33.3
Oromia	6	28.6
SNNPR	3	14.3
Tigray	2	9.5
Total	**21**	**100.0**

4.1.2 Type of Company

In terms of registration as a seed company 57% are registered as private limited seed company, and the rest are private farm(24%), private enterprise (14%) and international seed company (5%) (Table 2). The involvement of International seed companies in Ethiopia is very minimal because it is public dominated sector.

Table 2: Type of Company

Company type	Count	Percent
International seed company	1	5%
Private limited company	12	57%
Private Enterprise	3	14%
Private farm	5	24%
Total	**21**	**100**

4.1.3 Company administration

Regarding to administration of the private companies, the data from table 8 demonstrated that 24% of the respondents run their companies by board or executive committee, 29% run their company under executive director and 33% run by farm owners.

Table 3: Company administration

		Count (n=21)	Percent
By board or executive committee	Yes	5	24
By executive director	Yes	6	29
By sole proprietary/private farm	Yes	7	33

4.1.4 Type and number of employments in private seed sectors

The total permanent and contract employees hired by twenty-one private seed companies were 4116 and 2163 per month respectively, and this would contribute for an employment opportunity in the local areas (Table 4).

Table 4: Type and number of employments in private seed sectors surveyed

Employment Type	N	Sum	Mean
Number of permanent employees	21	4116	196
Number of contract employees	21	2163	103

4.1.5 Professionals working in Private Seed Sectors

Seed production agronomists are responsible for the management and execution of all phases of seed production. They are different from field agronomists in that they work specifically toward the creation of high quality seeds.

During seed production strict attention must be given to the maintenance of genetic purity and other qualities of seeds in order to exploit the full dividends sought to be obtained by introduction of new superior crop plant varieties. In other words, seed production must be carried out under standardized and well-organized condition.

Table 5: Professionals working in Private Seed Sectors

		Numbers				
Professionals	**PHD**	**MSC**	**BSC**	**Others**	**Total**	**%**
Agronomist	2	10	49	10	71	82
Seed Technicians	1	1	0	1	3	3
Breeders	1	0	0	0	1	1
Pathologist	0	0	2	1	3	3
Entomologist	0	0	0	0	0	0
Quality Control	0	0	3	1	4	5
Laboratory Technicians	0	0	1	4	5	6
Total	**4**	**11**	**55**	**17**	**87**	**100**
%	**5**	**13**	**63**	**20**	**100**	

The private sector lacks the required professionals both in quality and quantity. Table 5 shows the levels of education of the respondents. A total of 21 respondents were interviewed from 21 different private sectors. The levels of education of respondents were distributed as follows; there were four (5%) PHD holders, eleven (13%) master degree holders, fifty- five (65%) with a first degree and the remaining seventeen (20%) had other qualifications such as diploma and certificate holders. In the other way, in terms of professions seventy-one (82%) of the private seed sectors are agronomists, and five (6%) laboratory technicians, four (5%) are quality control, three (3% are seed technicians and one (3%) pathologist educational backgrounds.

4.3 Number of Private Seed Companies owned farm machineries & facilities

Most of the respondent (76%) owned tractors to cultivate their land, 70% owned farm implements, 20% had combiners, 70% had threshers, 50% had cleaning machines, 45% had packaging facilities, 25% had labelling machines, 74% had storages to store their products, and 45% owned trucks to transport seed (Table 6). Those who didn't have the required machineries and/or facilities would rent from other public/private service providers. The seed industry requires huge capital investments, especially in infrastructure and machinery.

Table 6: Number of Private Seed Companies owned farm machineries & facilities

Facilities	Companies Number		Percentage	
	Owned	Not owned	Owned	Not owned
Tractors	16	5	76	23
Threshers	14	6	70	30
Cleaning Machines	10	10	50	50
Packaging facilities	9	11	45	55
Labelling	5	15	25	75
Storages	14	5	74	26

4.4 Main Sources of Finance at Establishments of Private Seed Companies

According to the study, the main sources of finance or capital during the establishment of private companies were 100 % their own contribution, and additional 40% got loan from banks and 27% from grant (Table 7). As a result, they do not produce enough quality seed to serve farmers. Therefore, more than half of the respondents believed it is difficult to get loan when it compared with other challenges.

Table 7: Main sources of finance at establishments of Private Seed Companies

Sources	(n)	Yes	Percentage
Own Contribution	21	21	100
Bank	20	8	40
MFI	20	0	0
Grant	20	6	27

In most of developing countries development Banks, NGO'S and other financial institutions give loans to private seed producers at low interest rates so that they can make seed available to their community but in Ethiopia it is very scanty or lacking.

4.5 Road Conditions for Private Seed Companies

Road Accessibility is important for the moment of agricultural equipment, supply of farm inputs, inspection of fields by government authority and importantly timely distribution of seed to farmers. Poor road condition exposed private sector to un inspected field, huge carryover and discouraged to continue in seed sector, 42.9% have a road condition of both asphalt and all weather condition, 33.3% have all weather gravel road condition, 14.3% of the respondents have all weather and seasonal road condition and 9.5%'s road condition is asphalt.it was observed that the road condition to their farm is not suitable for seed production and distribution.

Table 8: Types of roads for seed production and marketing

Types of Roads	Frequency	Per cent
Asphalt road	2	9.5
All weather gravel	7	33.3
Both asphalt and all weather	9	42.9
All weather and seasonal	3	14.3
Total	**21**	**100.0**

4.6 Policy Environment in Promoting Private Sector Participation

According to the data collected from the 21 private seed companies interviewed, 47.6 % of the respondent said the investment policy encouraged the private seed growers whereas 52.4 % of the respondent replied the investment policy does not encourage the private seed growers.

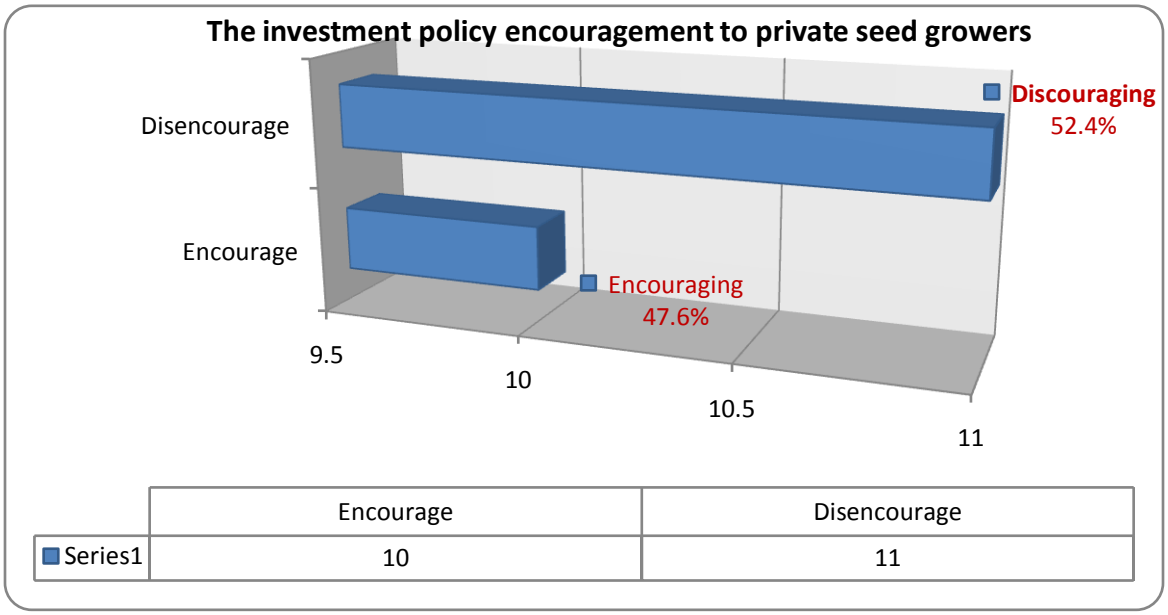

Figure 1.The investment policy encouragement to private seed growers

The main reasons according to respondents for discoursing private sector were lack of investment incentives (63.6 %), no investment guarantees (36.4%), inadequate market access (72.70 %), and no tax exemption (18.2%) (Table 9).

Table 9: Investment Policy Areas that Discouraged Private Seed Companies

Discouraging areas of Investment Policy	Count (n=11)	Percent
Market access	8	72.7
Investment incentives	7	63.6
Investment guarantees	4	36.4
Taxation	2	18.2
legal and judicial system	2	18.2
issuance of trade registration certificate	1	9.1

In addition, 71.4% of the respondent said the support of the government to the private sector is inadequate, 52.4% emphasises that inadequate access to public owned varieties of EGS, 57.1% of the respondent said there is a problem in policy implementation and enforcement at all level 47.6% said there is a challenge in varieties development and release system, 47.6% of the respondents replied that there is limitation in seed production and marketing, 33.3% of the

respondents replied that there are inadequate access to germplasm and lack of seed import and export opportunities, 28.6% replied that there is seed regulation but it lacks proper implementation, (Table 10).

Therefore, based on the information above, more than half of the respondents were challenged by inadequate support from the government side, followed by poor implementation and enforcement of the policy at all levels and the inadequacy access to EGS. This is confirmed by key informants responding that in the country there is no clear policy direction on the role of private sector in seed industry development and investment. For instance, in seed multiplication, private companies are accessing EGS from public research institutes that they give to the seed out-growers for seed multiplication.

In addition, the findings also showed that none of the private companies received support in research and crop improvement and there is no clear guideline on how to establish private breeding institutions in the country.

Table 10. Challenges related to policies

Challenges		Count (n=21)	Percent
Inadequate government support	Yes	15	71.4
Inadequate policy implementation and enforcement	Yes	12	57.1
Limitation in access to public owned EGS	Yes	11	52.4
Inadequate variety development and release	Yes	10	47.6
limited production and marketing	Yes	10	47.6
inadequate access to germplasm	Yes	7	33.3
limited seed import and export opportunity	Yes	7	33.3
absence of implementation of seed regulation	Yes	6	28.6

4.7 Institutional and administrative bottlenecks

The study revealed that there are institutional and administrative bottlenecks that hinder the participation of private sector in the national seed system. From all respondents, 57.1% of the respondent have limited financial resources, 52.4% each said there is lack of awareness of

varieties, lack of modern equipment and poor road infrastructure facilities, 38.1% have replied that there is lack of disease resistance varieties, 38.1% of the respondent believed there is inadequate partnership and networking with stakeholders, 33.3% of the respondent replied the District's support is insufficient (Table 11).

Table 11: Institutional and administrative bottlenecks

Challenges		Count(n=21)	Percent
lack of confidence in materials being marketed	Yes	6	28.6
lack of disease resistance seed varieties	Yes	8	38.1
lack of awareness of varieties	Yes	11	52.4
poor road infrastructure	Yes	11	52.4
limited financial resource to produce	Yes	12	57.1
lack of modern equipment	Yes	11	52.4
Inadequate support at district level	Yes	7	33.3
Inadequate partnership and networking of stakeholders	Yes	8	38.1

4.8 Constraints related to seed production and quality control

The respondents replied that 29% of companies produce seed on their own farm, 29% are responding that they are producing certified seed on out grower farm, and 43% grow both own and out grower farms (Figure 2). From this result one can understand that private seed companies had limited amount of land for their seed production. Various constraints in the current seed system prevent private seed companies from increasing quality seed production and making it available to smallholders.

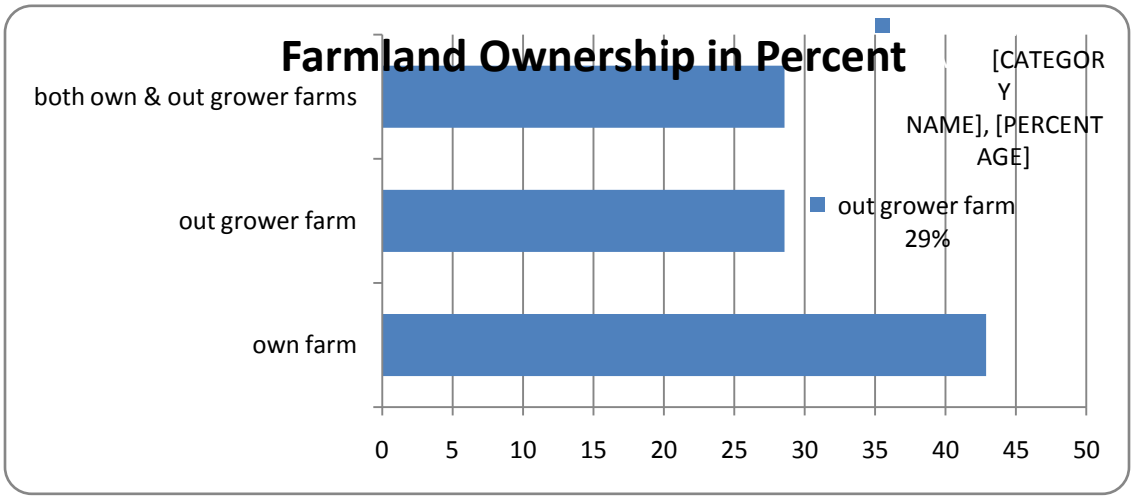

Figure 2Farm land ownership

The respondents were also asked from where they get EGS for certified seed production. Based on the study, the seed companies are accessing early generation seed from different sources, i.e., 57.1% respondents replied as from research centres, 38.1% from public seed enterprises, 23.8% from BoANR, 14.3% from their mother company and 4.8% from higher Learning Institutions (Table 12). From the above data, one can understand that the public seed sectors are the prominent EGS suppliers in the country.

Table 12: Percentage of companies replied their sources of EGS

Sources of EGS	**Number of Companies**		**Percentages**	
	Yes	No	Yes	No
Research Institutions	12	9	57.1	42.9
BoANR	5	16	23.8	76.2
Seed Enterprises	8	13	38.1	61.9
Higher Learning Institutions	1	20	4.8	95.2
Mother companies	3	18	14.3	85.7

4.9 Challenges of Seed Production and Quality Control

The challenges of seed production and quality control component were indicated as follows; 84.2% of the respondents were faced with problems of poor quality of source seed, 68.4% of the respondents replied that there was inadequate availability of EGS, 61.9% lack of fertile and

quality land with irrigation, 61.1% of the respondent had limited skill on seed production, 50% of the respondent replied that they are challenged with quality assurance system on the process of seed production, 47.6% said they are limited on few crops and 31.6% of the respondents replied they have scarcity of packaging facility during processing (Table 13).

Table 13: Challenges of seed production and quality control

Challenges		Count (n=19)	Percent
Limited availability of EGS	Yes	13	68.4
Poor quality of source seed	Yes	16	84.2
Limited skill of producers	Yes	11	61.1
Ensuring quality assurance	Yes	9	50.0
Lack of packaging facility	Yes	6	31.6
limited to a few crops	Yes	10	47.6
Access to good quality land with irrigation	Yes	13	61.9

According to the collected data, 95.2% of the respondents replied their seed is certified whereas, 4.7% replied not certified. Thus, from the certified seed 90% of the seed certified by Regional seed laboratories, 5% certified by Federal Seed laboratory and 5% each at Federal and Regional seed laboratories (Figure 3). Some private seed companies are importing registered certified seed of horticultural seeds from abroad for domestic use without quality control by the Ministry. This situation has contributed for the availability of seeds with low germination percentage, poor quality and also for existence of fake seed in the country.

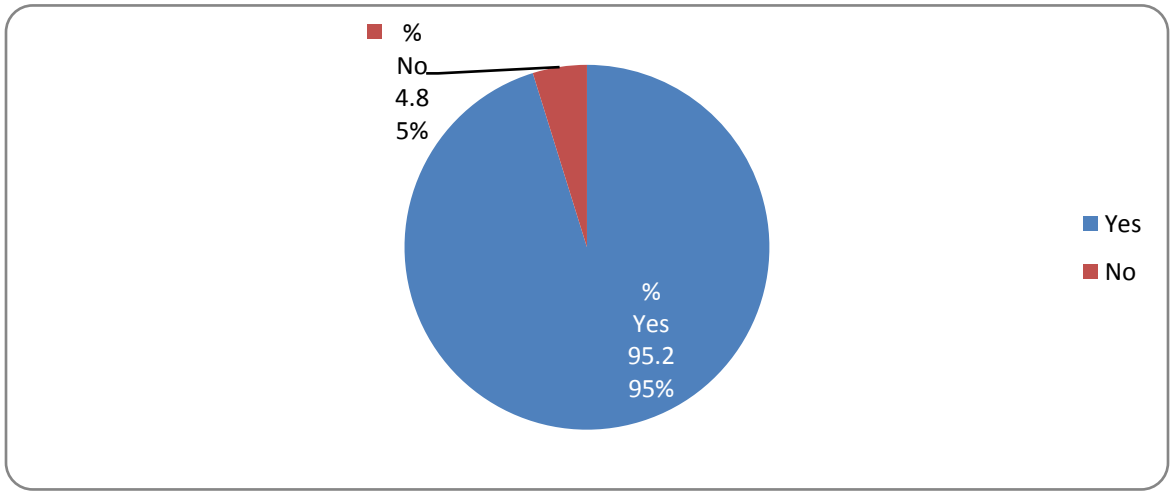

Figure 3 Certified seed producer

Out of all respondents questioned 70% of them have internal quality control laboratories and the remaining 30% don't have internal quality control laboratories. However, the capacity in terms of human and facilities of these seed companies is in question.

Table 14: Availability of internal quality control system

Availability of internal quality control system	Frequency	Percent
Yes	14	70
No	6	30
Total	**20**	**100**

Concerning the frequency of field visit, 70% of the respondents answered that their fields are visited by inspectors three times, 15% were replied two times, 10% said four times and the remaining 5% replied the inspector visited their farm once in the crop growing period. Regional certification labs do their best that field inspectors visit seed production fields as frequently as they can, and germination and purity is tested on seed samples, but the physical and human resources available for these tasks is simply inadequate.

In the study, according to respondents it was also found that there were different challenges that the companies faced during seed quality control and certification. The major challenges of private sector in quality control and certification were inadequate capacity of seed quality laboratory (47.6%), inspectors did not inspect and report on time (33.3%), inaccessibility of farm to road (14.3%) and poor communication between seed companies and quality control offices (14.3%) (Table 15). During focus group discussion the farmers also complaining that poor seed quality and sometimes low germination are the major problems faced after purchase of seeds.

Table 15: Challenges for seed quality certification

		Count	Percent
Timely inspection and reporting	Yes	7	33.3
Accessibility of farm to road	Yes	3	14.3
Rate of payment	Yes	1	4.8
poor communication	Yes	3	14.3
Inadequate capacity of Seed quality laboratory	Yes	10	47.6
Other challenges	Yes	1	4.8

4.10 Challenges Related to Seed Marketing and Distribution

According to the assessment, in general the distance where the respondent's distribution centre was close to their production sites. The study report revealed that 47.6% of the private sectors' distribution centre was close to their farm, 57.10% close to their union/community and 52.40% close to their District.

Respondents were asked how the companies set their seed price and replied that 47.6% set the price by assessing the market/ depend on the market condition, 38.1% depends on the production cost, 23.8% on public enterprise's prices and 19% based on the last year price (Table 16).

According to the information gathered, price determination is carried out in their own way differently across private sectors.

Table 16: Seed price setting

		Count	Percent
based on last year price	Yes	4	19.0
based on public seed enterprise	Yes	5	23.8
by assessing the market	Yes	10	47.6
based on production cost	Yes	8	38.1
other methods to set seed price	Yes	4	19.0

Based on the study, the private seed companies sold and distributed their seed by direct sale, contract/dealers and both method to different customers., From all respondents 58.3% replied that they sell and distributed their seed to nearby kebeles/ woredas by direct sale, 25% by contract/dealers, and 16.7% both direct sale & contract, for commercial farmers 60% by direct sale and 40% by contract/dealers, for cooperatives/union 66.7% by direct sale, 16.7% by contract/dealers and 16.7% both direct sale & contract. 100% of the respondents sold and distributed by direct sale each for non-cooperatives member of farmers, for public enterprise, to regional bureau of agriculture and to NGOs as shown below in (Table 17).

Table 17: Proportion of seed sold/distributed to customers

Type of customers	Direct sale	Contract/Dealers	Direct sale and contract
Nearby kebeles and/or woredas	58.3	25.0	16.7
Commercial farmers	60.0	40.0	0
Cooperatives/union	66.7	16.7	16.7
Non-cooperatives member farmers	100.0	0	0
Public seed enterprise	100.0	0	0
Regional Bureau of Agriculture	100.0	0	0
NGOs	100.0	0	0

From the study report, it was revealed that the major challenges of seed marketing and distribution were lack of an efficient marketing system (89.5%), lack of private participation in price setting (63.2%), absence of market competition (38.1%), absence of private agro dealers (28.6%), lack of price setting mechanism (42.9 %), and limited resource capacity (47.6%) (Table 18).

Table 18: Challenges of marketing and distribution

Challenges		Count (n=19)	Percent
Inefficient marketing system	Yes	17	89.5
Poor participation in price setting	Yes	12	63.2
absence of market competition	Yes	8	38.1
absence of private agro dealer	Yes	6	28.6
Lack of price setting mechanism	Yes	9	42.9
Resource capacity is limited	Yes	10	47.6

4.11 Summary Challenges of the Private Seed Sector Development

Going through the review and field assessment the following thematic areas and challenges were identified below.

Table 19: Main Challenges in hybrid maize seed production and marketing

Challenge area	Challenges
Policy environment	Inadequate access to germplasm and EGS,
	Inadequate policy implementation and enforcement (seed regulation, variety development & release)
	Lack of investment (infrastructure, facilities, incentives, guarantees, tax exemption, judicial system)
	Inadequate capacity and insufficient training to Private sector
	limited financial resource (in adequate access to institutional credit)
Institutional & Administrative bottlenecks	Inadequate institutional and administrative support (federal and regional)
	Inadequate partnership and networking of stakeholders
Seed production & quality control	Limited availability of quality EGS
	limited capacity on quality assurance (human, financial and facilities irrigable land)
	Limited Knowledge and skills
	Competition on few crops and varieties
	Inadequate access to fertile land and suitable irrigable land
	Poor participation in price setting
	Absence of market competition
Limited capacity (finance, equipment) Limited resources support	Inadequate private agro dealer
	Inadequate farm machineries and facilities (cleaning machine and labelling)
	Limited financial Resources

4.12 Priority constraints to improve the performance of the private seed sectorRanking priority:

The priorities of constraints were designated from the results that shown the highest percentages in the findings of the private seed company survey as indicated in Table 20 below.

Table 20. Priority constraints limiting the private sector performances

Thematic area	Constraints	% (n = 21)
Seed policy environment	Inefficient Marketing System	89.5
	Inadequate Government support in terms of finance, and capacity development	71.4
	Poor investment incentives	63.6
	Inadequate policy implementation and enforcement (on variety development & release, access to EGS & seed regulation)	57.1
Institutional & Administrative bottleneck	Inadequate government support (federal, regional and district levels)	71.4
	lack of awareness of varieties	52.4
	Poor road condition	52.4
Seed production & quality control	Poor quality EGS	84.2
	Limited availability of EGS	68.4
	Inadequate access to fertile land and suitable irrigable land	61.9
	Inadequate capacity of seed quality control system	47.6
Marketing constraints	Inefficient market access	72.7
	Poor participation on price setting	63.2
Capacity constraints Collaboration/partnership infrastructure	Limited knowledge of producers and ESA	61.1
	Inadequate farm machineries and facilities (cleaning machine and labeling)	60.0
	Limited financial Resources	57.1

Priority constraints

The constraints facing the seed sector require policy, regulatory, managerial and technical intervention if progress is to be achieved in seed industry development in Ethiopia. Core interventions and enabling actions can holistically strengthen the Ethiopian seed system to improve farmers' productivity and livelihoods through an increasingly open and competitive seed production system that provides an affordable and diversified choice of seeds from both the public and the private sector.

Policy environment: - In Ethiopia, **t**here are seed policy, law, regulation and different directives and guide lines developed, however, it is important to improve the policy environment that hinders private sector participation in seed business. The main ones are inadequate market system, inadequate support of the government to the private sector, lack of investment incentives, inadequate policy implementation and enforcement at all level and inadequate access to public owned varieties of EGS.

Institutional & administrative bottlenecks: -The study revealed that there are institutional and administrative bottlenecks that hindered the participation of private sector in the national seed system. The major bottlenecks are: inadequate government support (federal and regional), Inadequate public and private partnership and networking, limited financial resources, lack of awareness of varieties and lack of modern equipment and poor road infrastructure facilities.

Challenges of seed production and quality control: - The main challenges in the area of seed production and quality control are problems of poor quality of source seed, inadequate availability of EGS, lack of fertile and quality land with irrigation, limited skill on seed production, weak quality assurance system on the process of seed production, and inadequate capacity of seed quality laboratory.

Challenges related to seed marketing and distribution: - The survey revealed that the major challenges were lack of an efficient marketing system, lack of private companies' participation in price setting, limited resource capacity and lack of price setting mechanism.

Capacity constraints: -based on the study the private sector had limited knowledge and skills in seed business planning, marketing, seed brand development, managerial, technical, operational capacity and limited equipment and financial resources.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The overall importance of private seed sector in the seed system of Ethiopia is diversification of the seed sector, more and better choices of varieties and seeds, better and effective service

delivery, transfer of technology and additional investment in seed sector. The question is how the private sector can participate in the government dominated system that is not able to produce enough seed to meet the demand of the country.

Policy environment: - In Ethiopia**, t**here are seed policy, law, regulation and different directives and guide lines developed, however, it is important to improve the policy environment that hinders private sector participation in seed business. The main ones are inadequate market system, inadequate support of the government to the private sector, lack of investment incentives, inadequate policy implementation and enforcement at all level and inadequate access to public owned varieties of EGS. This is confirmed by key informants responding and literature review that in the country there is no clear policy direction on the role of private sector in seed industry development and investment.

Institutional & administrative bottlenecks: - The study revealed that there are institutional and administrative bottlenecks that hindered the participation of private sector in the national seed system. The major bottlenecks are: inadequate government support (federal and regional), inadequate public and private partnership and networking, limited financial resources, lack of awareness of varieties and lack of modern equipment and poor road infrastructure facilities.

Challenges of seed production and quality control: - The main challenges in the area of seed production and quality control are problems of poor quality of source seed, inadequate availability of EGS, lack of fertile and quality land with irrigation, limited skill on seed production, weak quality assurance system on the process of seed production, and inadequate capacity of seed quality laboratory.

Challenges related to seed marketing and distribution: - The survey revealed that the major challenges were lack of an efficient marketing system, lack of participation of private companies in price setting, limited resource capacity and inadequate demand and price setting mechanisms.

Capacity constraints: - based on the study the private sector had limited knowledge and skills in seed business planning, marketing, seed brand development, managerial, technical, operational capacity and limited equipment and financial resources.

Business management in Ethiopia is still to grow, and is not different for the seed sector. Half of the seed companies are family owned and of the total interviewed companies, the majority are managed by owners themselves. Thus, the business performance mainly depends on owner's capacity in taking the business forward. Although most of the companies claim that they have vision and strategic plan that is important to guide the business development, these are rarely defined and owned by employees, limiting the effectiveness of the vision and strategic plan. Only limited companies, regardless of their size, have fully defined their strategies and working towards achieving the vision. Managers of many of the private seed companies are not enthusiastic to run the seed business. Managers need to have vision and passion not only to run the business, but also to take the business to the next better level. Most of them seem to be satisfied with their current level of performance, as they are now generating some profit. However, business growth is more than making a profit. It is about becoming the best company in the sector. Thus, the current low energy of the managers, most of whom are owners, must change to ensure sustainable growth of the seed business following the state-of-the-art leadership that can transform the sector at large

5.2 Recommendations

The ultimate objective of this research is to identify, analyse and present major policies, laws, regulations, administrative practices, governance and institutional setups that constrained private seed sector seed production and marketing in Ethiopia and identify evidence based alternatives solutions to improve the supply of certified seed production system seed to small holder and livelihoods in Ethiopia.

Develop a clear policy and directives on variety development and release: The Private Seed Companies plays a critical role in the seed sector and shall continue to do so in promotion of the technologies developed by public institutions through commercial seed production, marketing and distribution.

Expand the EGS access to private seed companies: expanding private seed companies' access to EGS through issuing and enforcing an open and transparent application process with the clear goal of distributing EGS all entities that meet a set standard.

Reduce seed production constraints for private seed companies: Seed supply in Ethiopia is erratic for a number of reasons, with the key ones being major reliance on rain-fed agriculture**,** lack of cold storage for keeping carryover certified seed, and erratic supply of high quality foundation seed.

Thus, to develop support mechanisms and to address these challenges in allocation of irrigated land to seed producer companies since the product they produce has an exponential benefit to the economy and livelihoods of Ethiopians.

Improve Seed certification and quality control: Introducing and implementing seed quality and assurance are challenging. This process requires a robust legislative framework, sufficient financial resources, well-trained inspectors, capable laboratories and relevant legal mandates to conduct post-control tests and market inspections. In general, the responsibility for seed quality control should be vested in an independent agency, which has no links to production and is therefore impartial.

Explore more effective marketing and distribution models: One of the potential concerns of the government related to liberalizing the local seed industry is that, once given increased freedom to operate, seed companies will price gouge, to the detriment of the smallholder famers. This could include allowing own distribution, through private "agro-dealers" or through existing public channels, i.e. cooperatives). Seed companies should be encouraged to develop their own branding, marketing and customer base, driving competition and trust within the system. Therefore, it will help to minimize price increases and provide farmers with access to the best quality EGS.

The current seed distribution system is characterized by higher public system intervention, by low dealer margin, higher transportation costs, lack of dealer aggressiveness with respect to building seed sales volumes, low product education and customer service levels. Therefore, there is a need to develop new pilot programs to explore different distribution options, including support for the development of a large, high quality chain of farmer-oriented seed retailerssupport for private sector company pilots, such as dedicated seasonal kiosks, for companies which are committed to producing and distributing OPVs. The major challenge of

agro-dealers/ agents in the country is the absence/ weak enforcement and regulatory frame works for agro-dealer ship. There is therefore, an urgent need to develop and implement a policy and institutional frame work for the agro-dealership that outlines legitimate practices and expectations. Consequently, develop a binding agreement document between private owner and agro dealers that can build mutual understanding and trust.

Strengthen awareness and business environment: - expand and ensure access to incentives that promote private enterprises, such as access to tax incentives and foreign exchange for equipment and supplies from abroad or training for private sector seed growers in leadership and management skills. This could be driven by MoANR and/or Ethiopian Seed Association.

Access to capital: - An important factor for increasing private sector seed production in the formal sector is the availability of both working capital and investment capital for seed companies. It is important that the government should promote private sector through access to capital, credits and incentives, and support regional integration and harmonization to create larger markets. Support projects that directly work with private sector and strengthen their capacity.

Improve infrastructures: - According to the study, availability of basic infrastructures in most of the local private sectors are lacking. Thus, public investment in roads, availability and cost of electricity, water, telecommunications, and physical storage could significantly mitigate risks of private investment, and aid scaling up production. This signals a direct need for sustained attention to critical infrastructure development and maintenance, and also an opportunity for public-private partnership in infrastructure investment.

Build knowledge and skill of private seed companies: - the result of the study indicated that the emerging private sector companies in the country rarely have the experience or skills necessary to be able to ramp up and take over. These critical aspects could help to address: business planning, seed brand development, leadership and management skills, and technical and operational capacity etc.

Collaboration and partnership: - Collaborative institutional linkages need to be fostered among all actors and stakeholders to strengthen the seed system of the country.

Therefore, there is a need to develop a clear national seed policy direction and EGS guidelines and provision of support private sector investment in the seed sector, consistent and stable policy direction and implementation is needed at all levels. To incentivize domestic as well as foreign investments, well-designed and stepwise market liberalization is needed.

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