COMPETITION AUTHORITY OF KENYA

in collaboration with

KENYA MARKETS TRUST

Market Inquiry of the Seed Industry in Kenya

FINAL REPORT

PRESENTED BY

REMPAI

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List of Acronyms

AATF	African Agricultural Technology Foundation
AFSTA	African Seed Trade Association
AGRA	Alliance for Green Revolution in Africa
ASALs	Arid and Semi-Arid Lands
ASDS	Agricultural Sector Development Strategy
BASF	Baden Aniline and Soda Factory
CAADP	Comprehensive Africa Agriculture Development Programme
CAF	Competition Assessment Framework
CAK	Competition Authority of Kenya
CBO	Community Based Organization
CGA	Cereal Growers Association
CIMMYT	International Maize and Wheat Improvement Center
COMESA	Common Market for Eastern and Southern Africa
CSRP	Cereal Sector Reform Program
DFID	Department for International Development
DUS	Distinctness, uniformity and stability (in varietal testing)
ESP	Extension service providers
FBO	Faith Based Organization

FIS	International Seed Trade Federation
GDP	Gross domestic product
GMOs	Genetically Modified Organisms
Ha	Hectares
HCDA	Horticultural Crops Development Authority
ICT	Information and Communication Technology
KARI	Kenya Agricultural Research Institute
KARO	Kenya Agricultural Research Organization
KEPHIS	Kenya Plant Health Inspectorate Services
KG	Kilograms
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KMT	Kenya Markets Trust
KNBS	Kenya National Bureau of Statistics
KSC	Kenya Seed Company
MNC	Multinational Corporations
NASEP	National Agricultural Sector Extension Policy
NCPB	National Cereals and Produce Board
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organizations
NPT	National performance trial (in varietal testing)
NVRC	National Variety Release Committee
OPV	Open pollinated varieties
PBAK	Plant Breeders Association of Kenya
PCPB	Pest Control Products Board
PSC	Public Seed Company
REMPAI	Resource Management and Policy Analysis Institute
R&D	Research and Development
RoK	Republic of Kenya
SAP	Structural Adjustment Programs
SGR	Strategic Grain Reserve
STAK	Seed Trade Association of Kenya

Executive Summary

1. Background, objectives of the study and approach

Kenya has made considerable growth in the seed industry both in terms of regulatory framework, market liberalization and policy reforms, including review of the Plant Varieties Act and publication of the National Seed Policy. The number of players in the industry has increased tremendously since 1956 when the first seed company was established. By 2013, there were 116 registered seed companies but only a few of them controlled a disproportionately large share of the market. Lack of competition in an industry leads to inefficiencies and has been harmful to consumer (farmer) welfare through conduct such as collusion in price fixing and hindrances in free entry and exit as well as access to information. This market inquiry was commissioned by Competition Authority of Kenya (CAK) as part of its mandate to promote and safeguard competition in Kenya and to protect consumers from unfair and misleading market conduct. The Competition Authority partnered in this assignment with the Kenya Markets Trust (KMT), a non-governmental organization whose main objective is to improve the performance of key market systems in order to enhance inclusive and equitable growth and employment creation among the poor.

The specific objectives of the study were to: conduct a market inquiry/benchmarking in the Kenya seed sector; identify key competition and consumer protection issues; and, evaluate the functions and roles of the National Cereals and Produce Board (NCPB) and to assess if/how such functions and roles should be adjusted in order to improve competition in the seed sector. The results of the study are intended to assist CAK in promoting policies that enhance competition in the seed market thus increasing access to good quality seed and protecting the interests of consumers.

The study covered the main crop growing regions of the country. Following consultations with CAK and KMT, it was agreed that the inquiry focuses on only four crops that are important for the country's food security, in particular those grown predominantly by smallholders who often experience serious challenges in accessing good quality seeds. The selected crops were maize, beans, sorghum and cow peas. The main criteria/indicators used in the inquiry were divided into five categories as follows: i) research and development; ii) industry competitiveness; iii) support services for smallholders; iv) seed policies and regulations; and, v) general business environment. Respondents included industry regulators, associations, seed producers/breeders, and agro-dealers. The latter, due to their large numbers, were selected on the basis of a 'proportionate to population size' sampling approach. The study methodology did not require direct interviews with farmers since the focus was on assessment of indicators that favor/hinder competition in seed supply. The sections that follow give a summary of the main findings for the criteria/indicator categories listed above, conclusions and recommendations.

2. Factors influencing industry competition

2.1 Research and development (R&D)

A number of parameters were assessed and the findings were as follows:

i) Breeding capacity: the number of active breeders totals 64 for all the four selected crops with maize leading with 24 breeders

ii) From KEPHIS varieties list covering the period between 2011 and 2013, a total of 39 maize varieties had been released while the same period registered 4 releases for both sorghum and beans. There were no cowpeas varieties released during this period

iii) Given the involvement of government in seed production through state research and seed corporations, some public research institutions have been working closely with public seed companies (PSCs) such that most, if not all, of the varieties bred by the public research institutions were being licensed to only one PSC in which the government has 52% stake

iv) The monopoly powers of PSCs in the high altitude areas also implies an indirect and inequitable subsidy by government to the predominantly medium and large farmers in those regions compared to their smallholder counterparts in low altitude regions

v) The dominance of the PSCs is however gradually diminishing with foundation seed becoming more accessible either through private breeding programs or non-exclusive licensing from public research institutions.

vi) Public private partnerships (PPPs) in seed production and multi-company licensing will enable varieties to be produced and marketed by various companies hence avoiding possible "monopolization" of such important varieties. Examples of PPPs include: KARI-Dryland Seeds collaboration that led to release of a maize variety KDH3; multi-stakeholder partnership such as the KARI-CIMMYT-AATF collaboration that came up with the maize variety WE1101 (Tumaini-1); and, the collaboration between KARI, CIMMYT and BASF that led to the release of a striga-resistant maize variety (Ua Kayongo) that is available to a number of seed companies.

vii) In the opinion of seed producers, access to foundation seed ranges from good to excellent depending on the company that needs the foundation seed and the crop/variety in question. Maize is most available with a score of 80% while cowpeas are the least available with a score of 63%. Availability of foundation seed for sorghum and beans were rated at 68% and 73%, respectively. However public seed companies or parastatals (PSCs) tended to rate availability of foundation seed rather more favorably compared to private seed companies, probably due to the fact that the key breeder (KARI) is one of their collaborative institutions and they benefit from government subsidies.

viii) Although some of the private companies get seed from their own parent companies, they still rate the Kenyan situation poorly due to challenges facing local companies. There are concerns that the high concentrations in the industry (monopoly powers) are stifling investments in R&D. For example, foreign firms that would otherwise invest in R&D (e.g. in breeding) are simply importing their varieties and just going through the NPT process conducted by KEPHIS

2.2 Industry Structure and Pricing

i) Out of the 116 registered seed companies, KEPHIS varieties list indicated that only 10 have released or commercialized maize seed variety between 2000 and 2012. Sorghum on the other hand has been released by 5 seed companies, beans 4 (four) and 2 (two) for cowpeas

ii) Kenya imports maize seed from Zambia, Zimbabwe and South Africa while sorghum is mainly imported from Zambia and South Africa. Bean seed on the other hand comes mainly from Netherlands, France as well as South Africa, though most of it is French bean. Cowpeas seed has not been imported in the recent past. The main reasons for importation of seed for the four crops are: cheaper credit/finance; economies of scale on available facilities (for research and processing) for parent companies located outside Kenya; and, low levels of investment on R&D for medium and low altitude varieties and lack of access to good irrigated land

iii) The importation process takes over 40 days, a duration considered by industry players to be too long and thus likely to impact negatively on cost of seeds to farmers and production logistics and efficiency

iv) One public seed company (PSC) had 73% of the maize market share and is at position two with 28% of the sorghum market share. The PSC also has a subsidiary company which is the leading producer of bean seed, currently controlling 49% of the market share. The affiliation is viewed as a threat to competition since it not only advances a common marketing strategy that borders on collusion but also a merger-like force which creates a much bigger player capable of dominating other players in the industry

v) The perception of industry players, confirmed by the survey findings, is that public companies alliance has higher dominance in the highlands (to the tune of 80% of market share). However, in the medium and low altitude levels they are getting fair amount of competition from smaller companies

vi) Industry players maintain that the dominance of PSCs derives from their control over the 600 hybrid series of which just about 15 new varieties have been released in the last 5 years or so compared to over 120 for those targeting medium and low altitudes. This dominance locks out other private R&D investments that could lead to an increased number of seed varieties suitable for these regions thus raising the level of competition and possible price reductions for farmers. In addition to the monopoly powers of PSCs in high altitude regions, the involvement of government in selective provision of subsidized inputs such as seed dressing chemicals, skewed allocation of government tenders to PSCs as well as price setting are likely to injure competition in the seed industry

vii) The Kenyan seed market registered a Herfindahl index of 5452 for maize and 2106, 3196 and 3260 for sorghum, beans and cowpeas, respectively. Given that the Herfindahl index may range from approximately 0 for perfect competition to 10,000 for a pure monopoly, the Kenyan seed market is tending towards monopoly than perfect competition, especially for maize seed. The unfavorable index has more to do with imbalance in market share than a small number of players in the market

viii) The pricing system in the industry reflects the adverse impacts of monopoly, lack of innovation and poor access to information and training among the agro-dealers and agents. The latter are not particularly keen on volume based discounts and insist on fixed invoice

prices. There is also no forward buying or future contractual arrangements between distributors/seed producers and agro-dealers and agents. In theory, the main price determinants are: cost of seed production, competition (including subsidized pricing by competitors) and shelf life which for maize ranges between 1.5 to 2 years. However, in practice, government price support to PSCs plays a key role, particularly with respect to maize

ix) The leading company in maize seed production (a PSC) offers its stockists about KSh 280-320 per kg, a price that is highly subsidized; agro-dealers sell at KSh 300-350 per kg. This subsidy by the PSC is a major concern for the smaller players who contend that with a level playing field, seed prices could come down naturally through supply and demand forces rather than through subsidies. The industry players agree however that seed is currently not a major cost for famers compared for example to fertilizer/agro-chemicals, labor, transport and energy costs

x) It was established that on a scale of 0 to 10, seed companies score entry into the Kenya seed market at 6, implying that market entry is somewhat restrictive. The major factors influencing firms to enter the seed market are potential profitability as would be expected but there are also attractive prospects for expansion of the industry (increasing market size/demand). Factors hindering entry include the dominance of parastatal players; the lack of access to good irrigated land for seed production, the long time it takes for registration of a new product (3 to 4 years); limited scope of varieties in the highland region, and heavy investment requirements especially on R&D. It is relatively easy to exit the Kenyan seed industry: ease of exit from the industry was rated at about 9 out of 10. The main factor likely to push players out of the Kenyan market is low profitability but exit may be restricted by the high costs associated with liquidation of assets, reluctance to abandon complex national distribution system that usually takes a lot of effort and resources to establish and settlement of terminal benefits for employees

2.3 Support Services to smallholder farmers

i) Considering the number of agro-dealers registered with PCPB, the inquiry established that there were at least two agro-dealers in each of the towns or market centers surveyed. The number varies according to size of town and the level of crop farming intensity. Out of the towns surveyed, Karatina had the highest concentration of up to 60 agro-dealers within a radius of 2 km. On average, Kenyan towns have 13 agro-dealers which stock seeds in addition to a variety of inputs such as fertilizers, pesticides and livestock feed

ii) Most of the sales (74%) at the agro-dealer shops are done using 2kg packages. There are also smaller packages of 1kg for farmers who may need less than 2kg of seed, and efforts are already being made by some companies to distribute packages smaller than 1 kg

2.4 Quality of seed policies and regulations

i) Considering the combined effect of both the administrative and agro-climatic factors, variety release period in Kenya ranges from 2 to 4 years with an average period is 2.9 years. Though this is better than in some countries such as Uganda where the process can take up

to five years, it is still much longer than in countries with vibrant seed sectors such as South Africa, Egypt and India. In South Africa the process takes only one year for maize hence the country is able to release between 60 to 80 new varieties annually. Related to the issue of varietal release process is the question relating to the criteria used by KEPHIS in the NPT that focus predominantly on attributes such as germination rate and yield that some industry players contend should be left for consumers to determine. The relatively long variety release period in Kenya raises issues to do with the public goods nature of the service that KEPHIS provides; the need for compulsory testing; and, the extent to which smallholder farmers in particular would be exposed to risks were the trial period to be reduced drastically and the onus of quality shifted to the seed companies

ii) The study also assessed the seed policy regulatory framework which covers seed laws, guidelines and the general policy direction among other related regulatory structures. Apart from the monopoly powers and government subsidies through the Kenya Seed Company, industry players are also concerned about what they consider to be "over-regulation" of the seed sector. This sentiment derives from the recent reforms in the agriculture sector that have seen gazetting of a number of new Acts (such as Crops Act 2013, Agriculture, Fisheries and Food Authority (AFFA) Act 2013 and the Kenya Agricultural and Livestock Research Act 2013) all of which came at the same time as devolution of a number of agricultural services such as extension and reduction in line ministries from 44 to 18. It is not clear yet how these reforms will impact on the seed sector since their implementation is yet to commence in earnest. However, some players are already pointing at potential policy conflicts (particularly with regard to status of the Seeds and Plant Varieties Act Cap 369 following enactment of AFFA and whether KEPHIS will fall under AFFA) and potential compromises in efficiency of service provision

iii) One of the policies directly targeting the seed sector is the Kenya National Seed Policy which came into force in August 2010. It was hoped that the policy would among other things help the country to fully exploit the potential of improved varieties, facilitate effective regulation of the seed industry and create an enabling environment for effective participation of both public and private sectors in the production and utilization of quality seeds

iv) In addition to the seed policy, there is also the Seed and Plant Varieties Act and associated operational regulations that guide the seed industry. The main enforcement organization is KEPHIS which also registers the seed companies. About 15% of all KEPHIS staff are involved in seed inspection work but this allows them to inspect agro-dealers, on average, only once in a year. This may create room for unscrupulous agro-dealers to sell fake seeds to unsuspecting farmers immediately after the first visit with the confidence that it will be long before inspectors return

v) Seed producers were generally satisfied with the adequacy of the regulatory enforcement mechanisms in deterring unwanted mal-practices and encouraging the desired behavior. Responses ranged from 43% to 100% with an average of 72% (where 0 is not effective and 100% perfectly effective). KEPHIS receives about 12 cases of fake seeds per year while about 23% of the agro-dealers reported having received complaints of fake seed. Of the sampled agro-dealers, about 62% were of the opinion that the government is doing enough to stamp out fake seeds. The industry players are aiming at ensuring that seed is packaged

in different sizes in order to discourage repackaging which would otherwise open up avenue for seed adulteration. The industry also encourages farmers to keep the packaging of the seed they buy and plant to enable traceability in case the seeds fall short of expectations

vi) But notwithstanding the above considerations about the ability of KEPHIS to address the issue of fake seeds, the following issues touching on its capacity and legal environment appear not to have been addressed to the satisfaction of some industry players:
   a) The rationale for compulsory certification of seed varieties and the high costs involved
   b) Why the NPT process in Kenya takes about three years compared to countries like Ethiopia (one season with testing in at least 6 sites), South Africa, India and Tanzania (where there has been significant reduction in the certification period)
   c) Whether government and by extension, KEPHIS, is able to guarantee seed quality considering human capacity and budgetary challenges the regulator faces in addition to the fact that there is no law that requires that seed varieties, if imported, originate only from countries that also administer compulsory certification
   d) The extent to which a strong industry voice, and hence realization of the full potential of self-regulation, is being stifled by a government supported dominant player

*2.5 **Institutional support***

i) Traditionally, government has been playing the lead role in provision of extension services but this has gradually changed due to a number of developments: the need to cut down public expenditure (through cost sharing); rising number of farmers; government desire to promote private sector participation especially at other levels of the value chain instead of the traditional preoccupation with services relating to farm inputs and new production technologies; and, rising number of agricultural enterprises, value addition and commercialization that demand much more from extension agents in terms of time and specialization

ii) The current extension agents-to-farmer ratio of 1:1000 is quite low hence it has opened doors for higher participation of the private sector and other NGOs in delivery of extension services. The absence of appropriate regulations to govern the participation of the private sector may however cause duplication of services and sometimes confusion in messaging since the quality of the private sector extension service providers may not be verified especially in an economy with high rate of unemployment such as Kenya. Given the importance of extension in creating awareness on available new technologies, lack of adequate extension services may also limit visibility and availability of new crop varieties thus constraining competition in the seed sector[1]

[1] Strengths and weaknesses of the national extension system have been widely highlighted in many government policy documents. Suffice to mention, first, that the same sentiments (about weaknesses) are mentioned in the National Agricultural Extension Policy (NASEP) of June 2012 where it also laments lack of proper regulation and harmonization of services provided by private sector players. Secondly, responses

iii) Kenya has one main seed trade association, the Seed Trade Association of Kenya (STAK) whose mission is to promote the interests of seed trade membership by upholding standards in the provision of quality seeds. A discussion with the STAK management as well as a review of the Association's constitution, especially the objects, revealed that although its members pursue matters of mutual interest, this doesn't constitute anti-competition behavior. A common marketing strategy is not among issues promoted by the secretariat. Some paid-up members of STAK such as ACDI-VOCA (Kenya Maize Development Programme) and Plant Breeders Association of Kenya may not have seeds to sell thus discussion of a matter such as a common seed pricing strategy would not constitute a mutual interest. In addition, STAK constitution allows non-members to apply for participation in STAK meetings, further diluting any risks of collusion through STAK fora. Among its members, STAK is rated as being very good though it has a few areas where it needs to improve: mainly on the aspect of effectiveness in advocacy and resource mobilization

iv) There are other associations that are interested in seeds (e.g. AFSTA, CGA, PBAK) but their popularity was found to be relatively low, implying that STAK is the main association on which seed traders rely for representation, especially with regard to: providing a forum for lobbying, interaction and information sharing; representing the interests of the seed industry regionally and internationally; promoting the development of national seed industry to improve crop production; and, promoting activities that lead to regulatory harmonization

3. Impact of NCPB on the seed sector

i) The NCPB plays important roles in the grain sector which indirectly affect consumption of certified seed. The Board is the custodian of the strategic grain reserve, a role that involves maintaining a certain volume of grains on behalf of the government for purposes of supplying the market in case of an acute deficit in grain supply. NCPB may also be tasked by government to purchase maize at a given price as a way of stabilizing the market price especially when there is excess supply. It is also in charge of importing and distributing subsidized fertilizer under price guidelines provided by government.

ii) In addition to the statutory roles mentioned above, NCPB now plays commercial roles such as trading in various grains. For this commercial role, NCPB doesn't receive money from government hence trades like any other firm in the market. Another commercial role recently ventured into by NCPB is provision of seed distribution agency services for the willing seed companies. The performance of such roles is however faced with a lot of challenges that make it difficult for NCPB to effectively and efficiently serve its clients who include government, private seed companies, farmers and grain consumers. Delivery of services by NCPB was therefore rated quite low. Some of

from seed producers show that although the majority of them cover the entire country, they employ very few extension workers, a median of 6 staff members.

the weaknesses cited include dependency on government budget and price controls dictated by the government for the portion of stocks funded by the government

iii) This market inquiry found mostly indirect impacts of the functions of NCPB on the seed sector. As a major player providing a substantial market in the grains sector, the Board can potentially influence demand for seed by farmers given that farmers rely on proceeds from grain to finance most of the farm operations. Delayed payments and/or low prices may therefore limit demand for seed and vice-versa. This potential impact is somewhat tempered by the fact that the Board does not reward farmers' investments in high quality seeds for example by paying a premium for high grade and uniform grains delivered to its stores. In particular, the role of NCPB as an agency in seed distribution is so far utilized by only two seed companies namely, one public and one private, despite the fact that the facility is open to other seed companies as well. Although this partnership is likely to increase seed access by smallholder farmers particularly considering its wide distribution networks in the country, it essentially creates a distributional advantage to the companies that use NCPB

4. Structure of the horticulture seed sector

i) The horticulture seed sector differs from that of the food security crops in the following distinct ways: a) the regulatory process for vegetable seeds is faster; b) producers tend to be more knowledgeable: they know what they want/are more informed or more commercialized; c) there is a more level playing field (compared for example to the case of maize seeds); d) most of the hybrids are imported from, South Africa, India, Europe or America; and, e) farmers are willing to pay (e.g. whereas OPVs will go for as little as US$ 1.00/kg, the vegetable hybrid seed imports can go as high as US$ 100/kg)

ii) There is no direct public sector involvement in the vegetable seed sector but the government supports R&D at public institutions such as KARI and public universities. The national horticulture policy produced in 2012 is the main blue print for the industry development and sustainability but a number of its planned interventions such as increasing horticulture productivity, increased use of irrigation and diversification of production areas to include ASALS are yet to commence implementation

iii) Support services to smallholder producers have largely been through linkages and contractual arrangements with larger producers and exporters that in part provide extension services and quality control. Such arrangements are however under threat following the minimum residue limits (MRL) issue in the country's major horticulture market, the EU. The MRL challenge has since been tasked to the a coordinating committee of the Horticulture Competent Authority whose aim is to have a central notification and coordination structure on all phytosanitary standards in horticulture. The coordinating committee is chaired by KEPHIS; other institutions being, Pest Control Products Board (PCPB), HCDA, KARI, FPEAK and KFC

iv) As in the cereals seed market, KEPHIS is still the main regulator responsible for varietal certification for vegetable seeds while HCDA has been in charge of marketing and certification of export consignments. The new reforms under the Agriculture, Food and Fisheries (AFFA) Act however will see HCDA absorbed back in the Ministry of Agriculture, Livestock and Fisheries, a move that will most likely water down the specialized services it provided to small horticulture producers. The main private firms involved fall under the umbrella of Fresh Produce Exporters Association of Kenya (FPEAK) and the Kenya Flower Council (KFC), with activities of members of the latter being guided quite closely by an industry code of practice that ensures adherence to phytosanitary standards. The industry, including the vegetable seed sector, is also supported at the continental level by the Horticulture Council of Africa (HCA). The Council aims to address common challenges and constraints such as competition and compliance with safety and standards that these countries face especially in the European markets. It is also active in organizing for sharing of information and technical skills as well as providing a common platform for negotiations on economic partnership agreements (EPAs) and at the WTO

5. Recommendations

The main concerns arising from the market inquiry can be summarized as follows: low number of active breeders compared to the population of farmers; slow process of varietal release; low number of active seed companies and market dominance by less than four of them; exclusive licensing of seed varieties that confers monopoly powers over certain varieties; and, bureaucratic and time consuming seed import procedures (this constrains the potential of imports to minimize pressure on local seed stocks in case of high demand and therefore leaves consumers exposed to peddlers of fake seeds).In order to enhance competition and consumer protection in the Kenyan seed sector, the following interventions are recommended:

a) The number of seed varieties in the market has some degree of association with or influence on the level of competition. In the case of maize, for example, the market inquiry established that in the medium and low altitude regions where there are more varieties, the playing field is fairly level (less concentration) compared to the high altitudes. It is therefore recommended that: i) the government encourages more breeding programs by stepping up its budgetary allocations to breeding work especially in the high altitude regions and for crops such as beans, sorghum and cowpeas for which availability of foundation seed was rated poorly at between 67% and 78% compared to maize that was rated at 90%; ii) the government considers the possibility of availing some of the public land for seed production e.g. under the proposed Galena irrigation project; and, iii) more efforts be directed towards increasing production of seeds for other food security crops (particularly sorghum and beans) instead of concentrating just on maize

b) There are concerns that the high concentrations in the industry (monopoly powers) are stifling investments in R&D. For example, foreign firms that would otherwise invest in R&D (e.g. in breeding) are simply importing their varieties and going through the NPT process administered by KEPHIS. This denies the country the opportunities in direct investments

and related employment opportunities, research infrastructure and the potential institutional synergies that arise for example from human capacity building. Efforts should therefore be made to attract private sector R&D investments to complement government's efforts under its on-going reforms, especially the Kenya Agricultural and Livestock Research Act 2013 and the Comprehensive African Agricultural Development Program (CAADP) whose goal, among others, is to raise national budgetary allocations to agriculture, including research and extension

c) Lessons should be learned from the vegetable seed sector which industry players unanimously consider to have a level playing field. The key factors for this sort of equity in the market are level of commercialization, profitability and knowledge base of farmers; attributes that could easily be emulated in the food security seeds sector, especially with increased smallholder access to new production technologies and markets

d) Varietal release process should be streamlined with a view to reducing the time it takes as is already happening in countries like India and South Africa. Both the NPT and DUS procedures could be done concurrently to reduce the time needed for regulatory evaluations. However, the bigger issue here is the yield standard that companies are using – focusing primarily on beating the "check" varieties in yield, even if the purported value of the new variety is related to something other than yield, such as fodder value, early maturity, etc

e) Issue to do with industry integrity were addressed in this market inquiry, especially with regard to rising cases of fake seeds which require not just collaboration among law enforcement agencies, KEPHIS and seed producers but also aggressive educational campaigns for agro-dealers and farmers. Industry players are generally happy with the services offered by KEPHIS in terms of its functions but there are questions emerging about its capacity to deal effectively with all aspects of its regulatory mandate and whether some of its functions are indeed necessary. Some seed producers that were interviewed insist that KEPHIS is over-regulating the industry. Since the rationale for regulation can take many different forms, including lack of information, we have not favored any side in the debate and instead recommend that stakeholders and government convene consultations on the following pertinent issues: a) Why it is necessary to have compulsory certification of seed varieties; b) Why the NPT process in Kenya takes too long compared to other countries; and, c) Strategies for avoidance of legal loopholes and duplication of efforts among the regulatory institutions especially in the context of AFFA and the Crops Act

f) While monopolistic tendencies have been adequately demonstrated in this survey, the way forward regarding government support to PSCs should consider whether or not there are economies of scale in production and distribution of seeds (a dimension that was beyond the scope this market inquiry). If there are no economies of scale then there would be no advantage in government's support of monopoly except for strategic reasons anchored on national food security and the critical role that access to affordable seeds plays. On the basis of this market inquiry alone, therefore, no unequivocal support can be accorded to the views of the industry players that government should divest from the PSCs in order to increase competition in the seed industry. This recommendation is buttressed by the fact

that the majority of the seed producers stated that there were no particularly serious that that there are no serious impediments to entry into and/or exit from the seed market apart from the usual business issues to do with energy and financing costs and poor infrastructure

g) The seed distribution model in Kenya should be made more efficient by promoting functional specialization. The following issues should be addressed by the seed producers and STAK: a) minimizing conflicts between seed producers and their distributors by ensuring that the former do not also double as sales agents and by promoting legally binding contractual agreements; b) promoting price discount arrangements with agro-dealers that encourage them not just to increase their sales volumes but also to provide farmers with integrated service packages; c) increased use of ICT based strategies e.g. for tracking/management seed stocks in collaboration with KEPHIS in order to minimize losses arising from expired seeds; and, d) elimination, through advocacy, of some of the entry barriers such as poor infrastructure, high energy costs and insecurity in some of the regions of the country

h) Discussions with seed producers suggest that NCPB currently does not impact in any way on their operations despite the Board having agency arrangements with some seed companies. Although the agency arrangements allow the seed companies to use the Board's vast facilities distributed throughout the country, the offer is open to all players and no issues seem to have been raised so far regarding potential harm by such arrangements to competition in the seed market. That notwithstanding, it is recommended that stakeholders in the seed industry discuss with government the mandate of NCPB in the context of AFFA and the Crops Act 2013 with a view to avoiding conflicts and a likelihood of duplication of functions considering the Board's role as a buyer of last resort and custodian of the strategic reserve for national food security

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REMPAI takes full responsibility for any errors of misplaced emphasis and interpretation.

1.0 Background and Overview

1.1 The main crop enterprises in Kenyan agriculture

Kenya's economic growth and poverty alleviation are inextricably linked to agriculture and rural development, and, more specifically, performance of smallholder agriculture that accounts for over 70 percent of marketed production (KIPPRA, 2009). Thus agriculture is important for social and economic development of the country's economy. According to the most recent Economic Surveys, it directly contributes about 26 per cent of Kenya's Gross Domestic Product (GDP) and 27 per cent indirectly through linkages with manufacturing, distribution and other service- related sectors. The sector accounts for 65 per cent of Kenya's total exports, 18 per cent and 60 per cent of the formal and total employment, respectively (KIPPRA, 2013). Out of 8,767,954 households in the country, 6,324,819 households practice one or more types of farming (KNBS, 2012).

Despite the dominance of small scale farmers in agricultural production and marketing, their adoption of improved inputs such as fertilizer and high yielding seed varieties is relatively low. The smallholder producers rely mostly on informal supply of seed whose quality may not be known (STAK, 2010). Increasing farmers' demand for quality seeds is part of government's priority in transforming the agricultural sector and having competitive and efficient commodity value chains as a means of anchoring Vision 2030. The strategy to transform the agriculture sector is articulated in Agricultural Sector Development Strategy (ASDS, 2010 – 2020) which spells out six pillars for achieving the stated goals, namely: i) increasing productivity and commercialization; ii) promoting private sector participation; iii) promoting land and natural resource management; iv) improving agricultural services; v) ensuring market access, especially by smallholders; and, vi) having a conducive policy and regulatory environment.

Kenya's agriculture is characterized by a wide agro-diversity that allows farmers to engage in many different enterprises. However, crop production is the most wide spread economic activity with all the regions of the country producing a number of different crops in varying quantities (Annex 6.1). The structure of production of different crops in the country has a direct effect on the distribution of various seeds. The top five crops with wide national coverage are maize (2,008,346 ha), beans (689,377 ha), sorghum (225,782 ha), cowpeas (168,273 ha) and wheat (160,043 ha). Though wheat is second to maize in terms of production (511,994 tons compared to 3.5 million tons for maize), it is only important in three regions and is usually grown by few large scale farmers, making maize, beans, sorghum and cowpeas the most important food crops in Kenya. The study therefore focuses on the seed markets of these four leading food security crops[2].

Kenya relies heavily on maize as the staple food to the extent that shortage of the commodity is synonymous with food insecurity. Various communities consume maize either green, milled or in dry grain form. In terms of geographical coverage, the Rift Valley region, on average accounts for

[2] Besides these four crops, vegetable seeds are briefly discussed in the results section

over 50 percent of the national maize production while Nyanza and Western regions contribute about 14 percent each (Annex 6.1).

1.2 Importance of the seed sector

The use of improved (high quality) seed unlocks the productivity of other inputs such as labor, land and capital. This increases yields, lowering per unit cost of production, providing higher incomes and ensuring food security to the country. Compared to the costs of labor and fertilizer, the cost of seed is however not that high (Figure 1.1) though its reduction may still significantly lower total cost of production and thus improve farm profit margins. This has been demonstrated by several studies that have compared yields of high quality seed and locally saved unimproved seed under similar conditions. For instance, Mathenge et al. (2012) showed that growing certified hybrid maize seed increases total household income, reduces income deprivation relative to other households in the location, and negatively influences the likelihood that household income falls below the national poverty line. Further, Ndwiga et al. (2013) demonstrated that maize yields of hybrid seed were significantly higher than those of local maize seed and improved open pollinated varieties (OPVs) even in marginal production areas of Nyanza Province (Table 1.1).

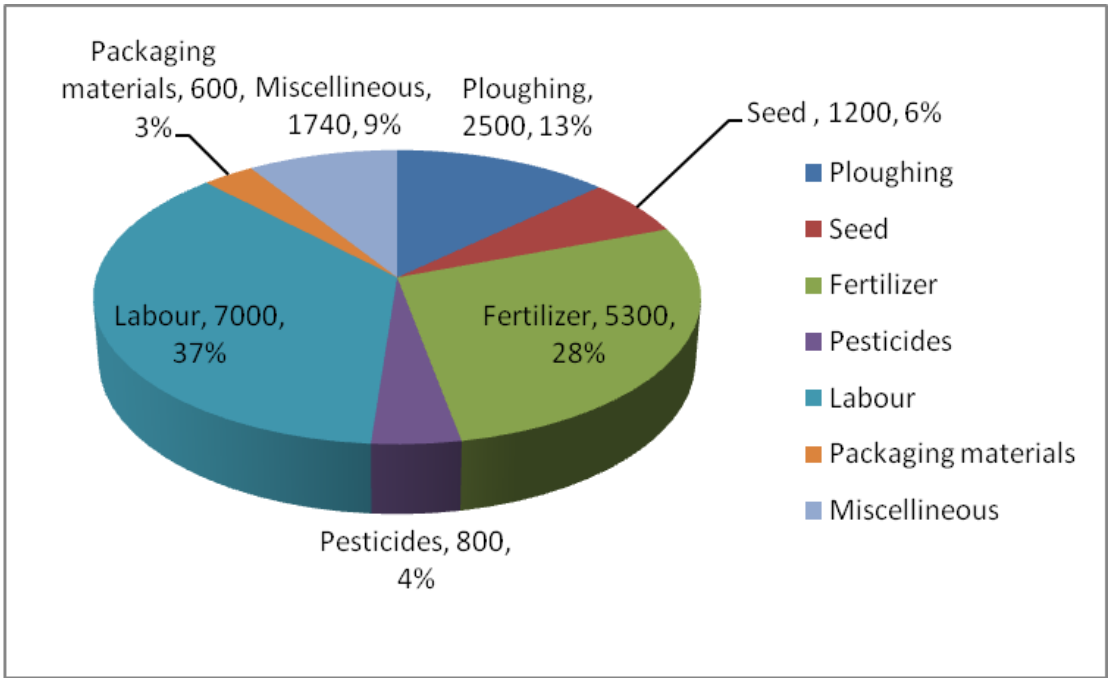


Figure 1.1: Proportions of costs per acre of various variable inputs in maize production

Source: KIPPRA (2012)

Table 1.1: Maize productivity by various seed types and cropping patterns (kg/acre)

Seed variety and cropping pattern	Regions		
	All	**Nyanza**	**Western**
Local maize, sole	227	251	157
Hybrid maize, sole	1,218	541	2,604
Improved OPV maize, sole	401	174	469
Local maize, intercropped	217	225	200
Hybrid maize intercropped	503	311	661
Average maize productivity	513	300	818

Source: Ndwiga et al. (2013)

1.3 The structure of the national seed sector

The seed industry in Kenya has been rapidly growing since early 20th century. From 1956 when the first seed company, the Kenya Seed Company, was established as a government entity, the subsector has seen progressive development such as the partial liberalization in 1980s that was enhanced in 1996 thereby opening entry for other players. To-date, the country has one of the lowest seed prices in the COMESA region (Table 1.2) and exports seeds to Uganda, Rwanda and Tanzania.

Table 1.2: Prices (USD/ton) of hybrid maize seeds in COMESA and SADC countries)

	Jul-Sept 2010	**Oct-Dec 2010**	**Jan-Mar 2011**	**Apr-Jun 2011**	**Jul-Sep 2011**	**Oct-Dec 2011**	**Jan-Mar 2012**	**Apr-Jun 2012**
Kenya	1830	1843	1,837	1657	1890	1797	2117	2007
Malawi	2470	2457	2,463	2737	2667	2587	2673	2217
Mozambique	1720	-	1,720	1953	1733	1827	2293	2030
Tanzania	2120	2210	2,165	2743	2403	2393	2783	2727
Zambia	2620	2910	2,765	3875	31567	3097	2640	2387

Source: Regional Agricultural Input Market Information and Transparency System (AMITSA)

The Kenyan seed industry consists of informal and formal players. The informal players account for nearly 78% of the total seed produced (National Seed Policy, 2010). Though the informal players have for a long time been confined to the smaller commercial producers, there is growing awareness creation by government, Non-Governmental Organizations (NGOs) and private seed companies for more farmers to use the formal channels. This is in recognition of the importance of high quality seed and the fact that the formal channels have regulatory checks that promote adherence to appropriate standards. These initiatives have led to many players entering the industry. By 2008, the country had 73 registered seed merchants differing in crops of specialization, levels of technological advancement, regional spread and market share.

The merchants usually obtain the foundation seed either from their own breeding or from other seed producers such as research institutions or large seed companies. Seed bulking is undertaken by the merchants (companies registered by KEPHIS and mandated to produce and/or import seed). They sell the seeds either to agro-vet shops (also called agro-dealers) who finally sell directly to farmers. Merchants may also enter into contractual arrangements with fellow seed merchants who do not produce the concerned seed. Such arrangements arise where one company has the distribution network but lacks a suitable crop variety while the competitor has a suitable variety but limited in distribution network. Some NGOs mobilize farmers into groups, buy seed directly from merchants, repackage and donate to farmers free of charge. This is done in pursuit of the objective of food security enhancement.

In addition to direct actors such as breeders, producers, bulkers, distributors and agro-dealers, there are various indirect players. These include government departments in the counties, parastatals and regulatory institutions, providers of extension services, associations and NGOs (Table 1.3). Associations such as Plant Breeders Association of Kenya and the Seed Trade Association of Kenya (STAK) play an important role in information sharing and advancement of members' rights. Though belonging to the National Government, the National Cereals and Produce Board (NCPB) is regarded as a direct player due to the role it plays in the marketing of farm produce and stocking of fertilizer sourced through government funds.

Table 1.3: Key players in the Kenyan seed subsector

	Players and their roles						
Roles of Players	Local variety breeding	Variety approval, registration & regulation	Breeders and foundation seed production	Seed production	Seed processing and packaging	Promotion and marketing	Distribution and sales
Players	KARI; KSC; Universities; MNCs; SME seed companies	KEPHIS	KARI; KSC; Universities; MNCs; SME seed companies	KSC; Seed Companies; MNCs; Community organizations	KSC; Seed Companies; MNCs	SMEs; MNCs	Private sector seed merchants; agents and stockists

Source: AGRA (2010)

1.4 Problem setting and objectives for the study

1.4.1 Problem setting and rationale for the study

Although the Kenya seed sector is relatively more developed compared to other countries in East Africa, both the private and public players in the sector acknowledge that the industry is less than optimally structured. The National Seed Policy document of 2010 notes inter alia that the seed market is mainly dominated by a few players largely dealing in only a few crops but who have a disproportionate influence on the pricing of seed. Market dominance by a few players harms competitiveness and may have various adverse consequences such as price fixing and low breeding/seed production capacity, lack of creativity and low efficiency. These consequences have tendencies of injuring agricultural productivity in general and seed consumers' welfare in particular.

Despite the campaign to have more farmers use certified seed and the apparent increase in number of seed merchants, Kenya regularly experiences deficits is supply of certified seed; especially during the short and long rains planting periods. In either of the seasons, excess demand for seeds often leads to prohibitively high prices, use of poor quality (own saved or recycled seed) and sometimes entry of unscrupulous seed sellers. The frequent deficits and associated negative repercussions may be attributed to overreliance on a few but well established seed dealers who often get overwhelmed during peak seasons. The other possible cause of deficits and high cost of seed and associated opportunistic behaviors is inadequate/inappropriate regulatory environment that may allow anti-competitive conduct by firms such as forming cartels and creating "artificial" deficits and fixing prices in seed supply.

This study was commissioned by the Competition Authority of Kenya (CAK) in collaboration with the Kenya Markets Trust (KMT). The Competition Authority is an independent body under the National Treasury, established under Section 7 of the Competition Act No. 12 of 2010. It commenced its activities in August, 2011. Its mandate is to promote and safeguard competition in Kenya and to protect consumers from unfair and misleading market conduct. Its functions, as provided under Section 9, among others, are to: carry out market inquiries, studies and research into matters relating to competition and the protection of the interests of consumers; investigate impediments to competition in the economy as a whole or in particular sectors, and; investigate policies, procedures and programs of regulatory authorities so as to assess their effects on competition and consumer welfare.

The Kenya Markets Trust (KMT) is a non-governmental organization, founded with the objective to enhance inclusive and equitable growth and employment creation among the poor by improving the performance of key market systems that are important for poor people in Kenya. In addition, KMT also assesses and influences the broader debate on the extent to which markets work for the poor.

As part of the efforts to effectively fulfill its mandate, CAK has partnered with KMT to conduct a market inquiry on the Kenya Seed Sector with particular focus on the status of various conditions necessary for industry competition. The results of the study will help CAK promote policies that enhance competition in the seed market and hence increase access to good quality seed and protect the vulnerable resource poor consumers (farmers).

1.4.2 Purpose of the study

The purpose of this study was to conduct a market inquiry in order to benchmark the enabling environment in which private enterprises operate within the Kenya seed sector and to identify opportunities to enhance the enabling environment and mitigate against competition constraints and consumer protection issues that negatively affect productivity, among others. More specifically, the study conducted an analysis of the seeds industry in the context of the broad national development (e.g. Vision 2030) and food security policy goals and also in the context of the key pillars of the agricultural sector development strategy (ASDS) for the period 2010-2020.

One of the goals of ASDS is increasing productivity, commercialization and competitiveness in the agricultural sector. This is in line with the first thrust of this study to the extent that the industry structure (degree of competitiveness) and participation of the public sector (for example through state corporations such as National Cereals and Produce Board) influence not just industry profitability but also farmers' access to good quality, affordable and well adapted seed varieties. The study also aimed at examining the seed industry regulatory environment in terms of policy actions and institutional capacity for promoting competitiveness and protecting consumer interests.

The market inquiry exercise delved into the potential demand for seeds, both domestically and regionally. This approach was meant to provide the regulatory institutions with insights into the most efficient industrial organization government should be promoting in order to ensure that the country does not end up with many competing firms with high excess capacities and hence costs to producers.

1.4.3 Specific objectives and key tasks

Given the purpose of the assignment, REMPAI closely worked with CAK and KMT in order to pursue the following specific objectives:

a) Conducting a market inquiry/benchmarking in the Kenya seed sector
b) Identifying key competition and consumer protection issues in the seed industry

To achieve the above objectives, REMPAI performed the following specific tasks:

a) Consulted with the CAK & KMT advisory committee and stakeholders to draw a road map to guide the market inquiry/benchmarking survey and process
b) Worked closely with CAK & KMT advisory Committee to prepare and finalize the market inquiry/ benchmarking tool

c) Pilot-tested the tool for suitability, determined sample size for different indicators and established the scope of market inquiry. The market enquiry specifically included the functions and role of the National Cereals & Produce Board of Kenya and if/how these should be adjusted to improve the sector
d) Collected information relating to the benchmark quantitative and qualitative indicators by reviewing existing secondary data and primary data where appropriate
e) Analyzed the collected data and determined various parameters that are relevant to the objectives of the assignment
f) Prepared the draft report relating to the findings of the market inquiry/benchmarking with recommendations for change within the industry and strategy about bringing about the change and disseminating information on the tool and results
g) Received feedback of the Advisory Committee on the draft report and revised accordingly

2.0 Approach and methods

2.1 General approach

The analysis of industry competitiveness was guided by the industrial organization paradigm that assesses the conduct and performance of an industry by relating these two parameters to the organization of the firms. This was hybridized with the Competition Assessment Framework (CAF) developed by the Department for International Development (DFID) of the United Kingdom which captures importance of vested interests among other institutional economic considerations. The results of the two models were evaluated on the basis of characteristics, causes, effects and remedies for various types of market structures such as perfect competition, oligopoly and monopoly including their derivatives. Where market imperfections exist, the study assessed the regulatory structures that are in place to ensure economic efficiency is maximized and equity achieved.

In order to facilitate future benchmarking of the Kenya seeds industry against comparator countries in the region, farmers' access to seeds was evaluated on the basis of the following parameters:

a) Research and development: research/breeding capacity, varietal releases, and availability of foundation seed
b) Industry competitiveness indicators: sales volumes, number of active seed producing firms and their market shares; share of state corporations active in the industry, entry and exit barriers, countervailing power
c) Support services for smallholders: rural agro-dealer network, seed packaging sizes, capacity and accessibility of the extension service and availability and memberships in seed associations
d) Seed policies and regulations: length of the administrative processes, quality of regulatory framework, inspectorate and enforcement capacity, and capacity to address industry integrity issues

e) General business environment: taxes and permits, ease of access to capital, contracting requirements, logistics and infrastructure

In view of the significant role played by the NCPB in the grains industry in terms of bulk purchases for fertilizer and active participation in the grains market, it was found necessary to assess the extent to which these roles impact on seed industry competitiveness.

In concurrence with the client and other study stakeholders, and as discussed in Section 1, the study was confined to four crops, namely: maize, beans, sorghum and cowpeas. The focus on these crops will also allow benchmarking with countries in the region where they are grown and regarded as major food security cereals and pulses. Historically, research emphasis and budgetary allocations in Kenya have favored these crops, maize in particular; they do not offer many data challenges as would be encountered for other relatively minor crops.

2.2 Literature review and collection of secondary data

Besides carrying out key informant interviews, REMPAI conducted a desk review of literature on the current situation in the seed industry; mainly from internet, published documents and government ministries. Information gathered during this stage also assisted in refining study tools that were used for conducting key informants interviews as well as informing interpretations of the collected primary data.

Some of the literature that REMPAI looked at include the Seed and Plant Varieties (Amendment) Act of 2012 (RoK, 2012), the National Seed Policy (RoK, 2011), the Competition Act No. 12 of 2009, the Pest Control Products Act (National Council for Law Reporting Revised Edition, 2012), Crops Act 2013 (RoK, 2013), Plant Protection Act (2012b), National Agricultural Sector Extension Policy (RoK, 2012a), Kenya Agricultural and Livestock Research Act 2013, Sessional Paper No 1 of 2012 on National Food and Nutrition Security Policy, Agricultural Sector Development Strategy (RoK, 2010), Competition Analysis Framework (DFID, 2008), the European Union's Directorate of Competition website, International Competition Network's website, South African Market inquiry report and profiles of various stakeholders among other documents.

2.3 Target population and sampling procedure for primary data collection

A list of relevant players in the Kenyan seed industry was drawn and shared with the client for validation. The players considered include the National Cereals and Produce Board, the Seed Trade Association of Kenya, the African Seed Trade Association (AFSTA), the Kenya Plant Health Inspectorate Services (KEPHIS), the Kenya Agricultural Research Institute (KARI), the Ministry of Agriculture, Livestock and Fisheries, seed companies and other seed producers and agro-dealers. The nature of the seed access parameters needed for the study did not require grassroots/farmer interviews. Hence there was no use of large structured survey questionnaires. Any additional information on seed users was obtained from secondary sources.

Different sampling techniques and data collection tools were applied to gather data from different players to economize on time and manpower. Sampling was both purposive and random but with stratification to enhance uniformity of respondent and comparability of the data collected. As inference of study results was not required and populations of all players are not known, a non-probability sampling design was used. The sampling approach aimed primarily at getting respondents with a high diversity of opinions, knowledge of (or linkages with) seed production and consumption. With the exception of agro-dealers, a combination of chain (starting with seed producers and other knowledgeable players), extreme case and typical case sampling techniques were employed. Efforts were made to ensure that most, if not all, of the relevant seed producers in the country participated in the interviews.

Further, private sector actors and government departments (mainly supply chain enablers and supporters) directly involved in the seed industry, farmer organizations such as Cereal Growers Association (CGA) and a representative sample of agro-dealers were interviewed. In addition, key informant interviews were conducted among easily accessible large farmers for purposes of capturing consumer protection issues, including their views on seed quality issues in order to establish whether there is unconscionable conduct or false/misleading representation.

The respondents were stratified as follows (see Annex 7.3. for a detailed listing):

Government Agencies: Ministry of Agriculture, Livestock and Fisheries; Kenya Agricultural Research Institute and the National Cereals and Produce Board. Strategic plans, service charters and organizational profiles were gathered as part of documents of literature review and secondary data collection.

Seed Industry Regulators: Kenya Plant Health Inspectorate Services (KEPHIS); Ministry of Agriculture; and, Pest Control Products Board

Seed Associations: This category had only four respondents hence all of them were interviewed: Seed Trade Association of Kenya (STAK); African Seed Trade Association (AFSTA); The Plant breeders Association of Kenya; and, Cereal Growers Association (CGA)

Seed Producers: The respondents here consisted of companies actively engaged in seed production and/or importation. In determining which companies were active, reference was made to the KEPHIS varieties list, STAK membership as well as company profiles. Although KEPHIS has registered about 116 active seed companies, the majority of them fall into the category of 'seed merchants", a rather amorphous group that includes large farms and various types of traders. For purposes of this market inquiry, "seed producers" refer to companies that conduct breeding work and hence have released varieties that are being marketed either by themselves or by appointed distributors; institutions (e.g. KARI and universities) that are mainly engaged in breeding work and license their new varieties to seed companies for commercialization; and, companies (distributors) that largely distribute seeds for others but also produce their own varieties. This definition of a seed producer gives the following target population: Africa and non-Africa multinational companies (6); locally established private companies (9); parastatals or public seed companies (10); emerging

private companies (10) and companies with potential to enter the market and or to scale up their level of commercialization (10). Out of this total of 45 companies, 25 were ruled out because they were either not dealing with any of the four crops of interest or were yet to commence their operations. Out of the remaining 20 firms, two (2) were interviewed through telephone while 16 went through person-person interviews. Only two of the targeted seed companies were unavailable for the interviews. The interviews targeted senior officers whose titles/names of positions differed from company to company ranging from business development managers, marketing managers to general managers. A checklist of relevant areas of discussion was used to interview the stakeholders and collect relevant information. Informative documents such as annual reports were also collected to provide secondary data (see Annex 6.2 for list of seed producers interviewed).

For the analysis of market share, production data from 21 private and public seed companies/institutions actively involved in the production and marketing of seeds for the study commodities (maize, sorghum, beans and cowpeas) for the period 2009-2013 was provided by KEPHIS. However, the names of these 21 companies have been kept anonymous since KEPHIS had not yet received permission to share them out by the time of finalizing the report.

Agro-Dealers: This group had many respondents spread across the country. For the purpose of this assignment, it was neither necessary nor practical to interview agro-dealers in all the counties. This is because most of the agro-dealers in different localities face fairly similar business environments. In view of this, only a representative sample of the agro-dealers was interviewed in selected counties where crop enterprises are predominant. To get the representative sample, a list of major seed agro-dealers in the major production areas of the study crops was obtained from the inventory of registered agro-dealers of the Pest Control Products Board (PCPB). To ensure fair representation, the country was first zoned into seed marketing and consumption regions: a) Nairobi and its surroundings, b) Central Province, c) Upper Eastern, d) Lower Eastern, e) Rift Valley, f) South Rift/Nyanza region, and g) Western region.

The sample size in each region was determined through 'proportionate to population size' approach, with the aim of getting a total sample size of about 130 agro-dealers that could be accommodated by the survey time and budget. From sub-lists of each of these regions, a systematic random sampling approach was used to draw 14% of the registered agro-dealers/region, giving a total of 132 respondents (Table 2.1).

Table 2.1: Number of sampled agro-dealers in different regions

Region	Number of Agro-dealers	Number sampled for interview**
1. Upper Eastern	143	20
2. Lower Eastern	89	12
3. Central	186	27
4. Rift Valley	133	19
5.South Rift/Nyanza	66	9
6. Nairobi & Surrounding	175	25
7. Western	135	20
Total	927	132

** In some cases the sampled proportion is 13% or 15% due to rounding off of persons

Pre-testing and data Collection

Before conducting the interviews, each of the various draft tools was pre-tested with the appropriate category of stakeholders. Although all categories of stakeholders were found in Nairobi, pre-testing of the agro-dealer questionnaire was extended to nearby towns such as Kikuyu, Limuru and Kiambu. This assisted in making sure that the instrument is relevant to both town and rural agro-dealers. Some of the primary data collection techniques included key informant interviews and person-to-person interviews with agro-dealers or agro-shop managers. These were done by use of checklists and a semi-structured questionnaire, respectively (see Annex 6.3 – 6.6).

2.4 Analytical framework

Data analysis was based on the following thematic areas (parameters) that have been further broken down in Tables 2.2-2.8 that also show expected signs of impact of the parameters on an index of farmers' access to seeds[3]: support and linkages of the industry with research and development; key measures of competition such as concentration ratios; parameters of competition among market actors (such as pricing strategies, product differentiation, inherent and perceived quality differences, service, volumes/market share as well as ease of entry and exit from the industry); measures of production/turnover and profitability; logistics in the industry; policy support; and appropriateness and satisfaction with the regulatory services. Analysis was also done to highlight measures of conduct such as collusion and industry malpractices among a few players or by a dominant player.

In some cases, data for the public seed companies (parastatals) has been compared with that of private seed companies. Also, for the total figures an additional set of data from AgriExperience has been included. However, this data does not compare well with that of REMPAI since it was collected from selected company managers during a round-table stakeholder meeting held at

[3] The index aims at estimating the ease of access to seeds by farmers and takes into account combinations of factors. A more nuanced procedure for constructing the index is being developed in a parallel assignment by Ed Mabaya for Agri-Experience (2013). This market inquiry, however, was not tasked to estimate such an index.

Panafric hotel in Nairobi on 13th May 2014 (the managers were requested to conceal their identities and company names hence their responses were not probed through a face-t-face interaction as was the case for the REMPAI interviews (conducted in October and November 2013). Past studies have already shown that anonymously collected data has many shortcomings including the fact that it decreases accountability of respondents, thereby decreasing motivation to answer questions thoughtfully and precisely (see for example Lelkes et al., 2012). Further, since the data was anonymously collected after workshop presentations and discussions, any challenges as well as opportunities related to the seed sector that were mentioned or conceived preceding the filling in of the questionnaires may have had an effect on the precision of the answers provided by the respondents. Despite the shortcomings of the Panafric data, the report has taken them into account and presents them alongside those of REMPAI albeit without delving into detailed comparative analysis.

Table 2.2: Research & Development Parameters

Variables	Unit	Target Respondent	Impact on seed access index
Number of Active breeders per capita	Per capita	KARI/KEPHIS/MOALF/STAK/AFSTA	Positive
3 year moving average of annual variety releases for top 4 food security crops	#	KEPHIS	Positive
Availability of foundation seed	Score out of 10	Seed Companies	Positive

Table 2.3: Industry Competitiveness Parameters

Variables	Unit	Target Respondent	Impact on seed access index
Number of Active seed companies per number of farmers	Per capita	STAK/MOALF	Positive
Length of time it takes to import seed from neighboring countries	Days	STAK/AFSTA/KEPHIS/Department of International Trade	Negative
Combined Market share of top seed companies or Herfindal index (by turnover)	%	STAK/AFSTA/Seed Companies	Negative
Number of contractual arrangements that lock agro dealers to one company	#	Seed Companies/Agro dealers/Competition Authority of Kenya	Negative
Market share of current or past government state corporations	%	STAK/AFSTA/	Negative
Ease of entry and exit	Score out of 10	Companies/STAK/AFSTA/Agro dealers	Positive

Table 2.4: Support Service to smallholder farmers

Variables	Unit	Target Respondent	Impact on seed access index
Concentration of rural agro-dealer networks	Per capita	Seed Companies, MoALF, CBS	Positive
Availability of seed in small packages (e.g. 2kg or less for maize)	Sales volume	Agro dealers, Seed companies	Positive
Level of contractual flexibility for agro dealers to repackage	Score out of 10	Agro dealers/Companies	Negative
Level of oversight/supervision on repackaging	Score out of 10	Agro dealers/Companies	Positive
Implication of repackaging on cost	%	Agro dealers/companies	Negative

Table 2.5: Quality of seed policies and regulations

Variables on Supportiveness of the Regulatory Framework	Unit	Target Respondent	Impact on seed access index
Length of varietal release process	Months	KEPHIS,KARI, Seed Companies, Universities	Negative
Number of seed production/distribution programs	#	MOALF	Positive
Efforts to stamp out fake seed- e. g i. Number of cases recorded ii. number of disciplinary actions taken (per year) iii. Time taken to respond to complaints	Score of 10	KEPHIS/MOALF/KEBS, PCPB/KENFAP	Positive
Adequacy of the seed standard (if present)- number of parameters e.g. safety, purity, etc	Score out of 10	KEPHIS, STAK, KENFAP/KFA	Positive
Frequency of regulatory awareness creation events per year	#	KEPHIS/KEBS/PCPB/NBA/MOALF/CAK	positive
Adequacy of the industry code of practice	Score out of 10	KEPHIS, KEBS, Seed Companies, Agro dealers, CAK	Positive

Table 2.6 Regulatory capacity to address standards and integrity issues

Variables (e.g. fake seeds, collusion, adulterations and compliance with standards)	Unit	Target Respondent	Impact on seed access index
Number of regulatory institutions	#	MOALF, Seed Companies, Agro-dealers, STAK	Positive
Adequacy of legislations (penalties and offences covered)	Score out of 10	KEPHIS, KEBS, Competition Authority of Kenya	Positive
Inspection frequency per year	#	KEPHIS, PCPB,NBA	Positive
Number of inspectors/manpower	Per capita	KEPHIS,NBA	Positive
Mandate of the regulatory institutions (e.g. adequacy of scope, prosecution powers)	Score	KEPHIS/KEBS/PCPB /NBA	Positive

Table 2.7: Institutional Support

Variables	Unit	Target Respondent	Impact on seed access index
Number of extension officers per 1000 farmers	#	MOALF, Seed companies/KENFAP	Positive
Number of National Seed Associations	#	STAK/MOALF/Agro dealers	Positive
Quality of National Seed Associations - (activeness, effectiveness in advocacy, governance, etc)	Score out of 10	STAK/AFSTA/Seed Companies/Agro dealers/KENFAP	Positive

Table 2.8: General Business Environment

Variable	Unit	Target Respondent	Impact on seed access index
Level of taxes and permits,	#	Seed Companies, Agro dealers, Department of trade, KEPHIS, PCPB, NBA	Negative
Ease of access to capital	Score out of 10	Seed Companies, Agro dealers	Positive
Adherence to Contracting requirements,	Score out of 10	Seed companies, Agro dealers	Positive
Logistics and infrastructure	Score out of 10	Seed companies, Agro dealers, KENFAP	Positive

3.0 Results and Discussion

3.1 Research and development in the Kenya seed sector

3.1.1 Number of active breeders

This section highlights breeding efforts by both public and private institutions in the country. As indicated in Table 3.1 it is clear that the country has very few breeders given that over 6 million farming households rely on one or more forms of agricultural activities for their livelihoods (KNBS 2012). Discussions with stakeholders revealed that the scarcity of breeders is acute and that that some scientists are forced to engage in breeding of more than one crop, often in areas outside their core specialization. The limited breeding capacity may also limit the number of crop varieties available thus reducing competition in the seed market. This is especially so given that most of the available varieties may be patented and licensed to only one seed company.

Table 3.1 Active breeders or scientists working in seed companies in Kenya

Crop	Public breeders**	Private breeders**	Total
Maize	14	11	25
Sorghum	5	5	10
Beans	15	7	22
Cow peas	6	5	11
Total	40	28	68

** Data includes both MSc and PhD qualified breeders. Their affiliation to seed companies has been kept anonymous

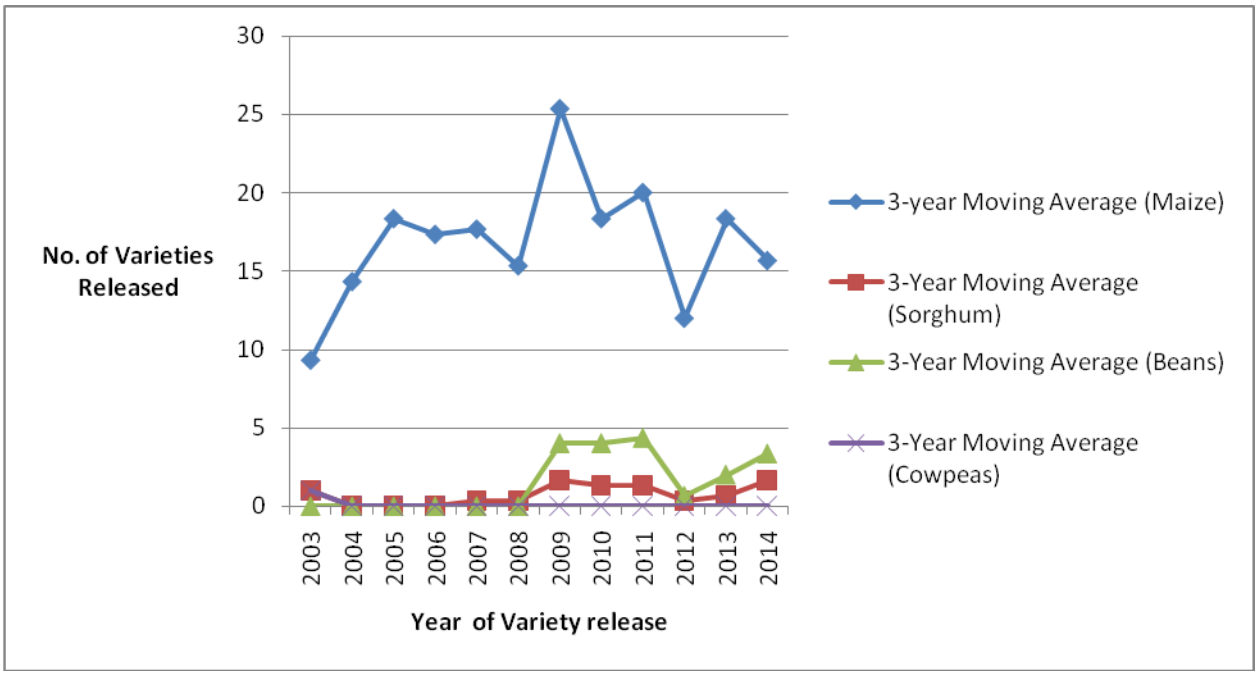
Source: Seed companies REMPAI interviewed, 2013

3.1.2 Varieties released in last three years

All crop varieties released in the country are documented and updated regularly by KEPHIS. Over the years, maize has been given more attention than other crops (Annex 7.2). This is because it is the most widely cultivated crop in the country, given its importance for food security. Also, its productivity declines significantly whenever seed is recycled, unlike the beans and peas. Such "ability to recycle" makes demand for bean and cowpea seed quite low thus discouraging investments in the breeding of pulses. However, some farmers feel that recycling legumes is important because the supply of certified legume seeds is erratic and unreliable.

It takes more than three years to release a variety depending on the crop of interest, weather conditions as well as efficiency of the regulatory and approval processes. Figure 3.1 shows that there is no clear trend on the number of varieties released per year, though releases for all seed varieties picked up somewhat between 2008 and 2011.

Figure 3.1: Three-year moving average for number of varieties released



Source: KEPHIS/AgriExperience Varieties List (2014)

3.1.3 Availability of foundation seed

Sources of foundation seed differ according to the crop and seed producing companies. Some companies have their own teams of breeders as well as relevant facilities and germplasm and so produce their own foundation seed. This is particularly so for multinational companies which mostly rely on their parent companies for breeding roles. Other smaller companies largely rely on external research institutions/companies linked to them through contractual arrangements. This is particularly so for cereals like maize which require long breeding cycles. Some public research institutions such as Universities are more interested in breeding than actual seed production hence register varieties (especially beans) which they license to local seed companies.

For a long time, maize bred by public research institutes would only be licensed to one PSC thus denying private companies any chance to produce and sell such seed. This is gradually changing with foundation seed becoming more accessible with time either through private breeding programs or licenses from public institutions.

There are also public private partnerships for producing seeds. An example is the KARI-Dryland Seeds collaboration that led to release of a maize variety KDH3. There is also a multi-stakeholder partnership such as the KARI-CIMMYT-AATF collaboration that came up with the maize variety WE1101 (Tumaini-1). The collaboration between KARI, CIMMYT and BASF has also released a striga-resistant maize variety (Ua Kayongo) that is available to a number of seed companies. These

types of multi-company licensing have enabled varieties to be produced and marketed by various companies hence avoiding possible "monopolization" of such important varieties.

It was however observed that on availability of foundation seed PSCs tended to rate the Kenyan seed industry rather favorably compared to private seed companies (Table 3.2). This could be due to subsidized access to some important inputs and services such as research facilities (field stations, research technicians and public research laboratories) and agro-chemicals needed to produce seed as well as distribution channels. Such subsidies may minimize the seed production burden on public seed companies hence influencing their responses on availability of foundation seed.

Table 3.2 Rating of availability of foundation seed

Crop	Std Dev	Minimum	Maximum	Count	Mean ASP	Mean PCO	Mean PSCs	AgExp
Maize	2.07	4	10	13	8.0	7.8	9.0	5.25
Sorghum	2.39	4	10	8	6.8	6.4	6.7	5.17
Beans	2.56	4	10	7	7.3	5.8	8.3	4.93
Cowpeas	2.75	3	10	7	6.3	4.5	7.3	3.20

Source: Interviews with seed producers, 2013

Note: ASPs=All Seed Producers; PCOs=Private Companies only; PSCs=Public Seed Companies/Institutions; AgExp= AgriExperience data

Table 3.3: Summary of research and development parameters

Variables	Indicator	Computation of indicator
Number of farmers per breeder	90,012	Number of farmers/number of breeders in Table 3.1) i.e. 6,324,819/68
Three year moving Average of annual variety releases for top 4 food security crops in the last three years	number	
Sorghum	1.0	Number of varieties released as shown in annex 7.9
Beans	0.3	Number of varieties released as shown in annex 7.9
Cowpeas	0.0	Number of varieties released as shown in annex 7.9
Maize	12.7	Number of varieties released as shown in annex 7.9
Availability of foundation seed: Maize	8.0	Average score as shown in Table 3.2
Sorghum	6.8	Average score as shown in Table 3.2
Beans	7.3	Average score as shown in Table 3.2
Cowpeas	6.3	Average score as shown in Table 3.2
Average for the 4 crops	7.1	Average score as shown in Table 3.2

Source: Seed Producer Interviews and KEPHIS, 2013

3.2 Industry competitiveness

3.2.1 Number of active seed companies

At one point Kenya only had one seed company (Kenya Seed Company) which was registered in 1956. Since liberalization of the seed subsector, several seed companies have been undertaking production and/or importation of various seeds. By mid 2005, KEPHIS had registered a total of 50 seed companies which rose to 82 by 2010 and thereafter to 116 in 2013. However, majority of the registered seed companies are actually seed merchants that are not involved in any breeding activities. It therefore follows that although many of the companies are active, they may not be involved in actual breeding and release of varieties; the few companies featuring on the KEPHIS varieties list are shown in Table 3.4[4] (see Annex 7.3 for seed companies currently involved in the production of seed for the crop commodities documented in this report).

[4] It is erroneous to assume that the varieties listed on the companies' web sites are their own: for example, FreshCo Seeds list about nine different varieties, including the famous Katumani that was developed by KARI and other maize

Table 3.4: Number of varieties by different seed companies (2000-2013)

			Number of Crop Varieties Released/Commercialized							
			Maize		Sorghum		Beans		Cowpeas	
	Name of Company	Year RGSTD	RELSD	COMLZD	RELSD	COMLZD	RELSD	COMLZD	RELSD	COMLZD
1	Kenya Seed	1956	39	41	2	3	-	12	-	1
2	East African Seed	1980	1	5	-		-		-	1
3	Western Seed	1992	46	29	1		-		1	1
4	Simlaw Seed	1989	-		-		1	1	-	
5	Monsanto/DeKalb	2000	8	11	-		-		-	
6	FreshCo	1996	1	12	-		-	3	-	
7	KARI Seed Unit	1999	56	4	8	5	1		3	2
8	Pannar Seed	2001	24	25	-		-		-	
9	Agri-SeedCo	2001	15	18	1	1	-		-	
10	Dryland Seeds Ltd	2003	1	11	-	1	-		-	1
11	GNASS	2007	-	1	-	1	-		-	
12	Lagrotech	1991	2	1	-		-		-	
13	Pioneer Hybrid Kenya	2012	7	12	-		-		-	
14	University of Nairobi	2009	-	-	-		8		-	
15	Egerton University	-	-	-	-		3		-	
16	Leldet	-	-	4	1	3	-	3	-	
17	Migotiyo	2005	-		-		-		-	
18	Elgon Kenya	1980	1	3	-		-	3	-	
19	Olerai	2011	2	3	-		-		-	
20	Faida Seeds/Oil Crop Development	-	1	4	-		-	3	-	
21	ADC	-	-	1						
22	Alphega	-		3						
23	VetAgro	-		1						
24	Crop Africa	-		2						
25	Oreon	-		4						
26	Sacred			4						
27	Gicheha			2						
28	Naseco			1						
29	Victoria			2						
30	Wakala			1						

Source: Interviews of seed producers, KEPHIS varieties list (2012), AgriExperience (2014) and AMITSA (May 2014)

Going by the varieties commercialized, there are about 26 seed companies involved in production of maize seed, three of which are public or parastatals while 23 are private (AgriExperience, 2014). For sorghum, there are six (6) companies out of which two are public while four (4) are private. Just as in the case of sorghum, there are 6 companies for beans (2 public and 4 private), while cowpeas has a total of five companies, out of which two are public while three are private. It is important to note, however, that the varieties used in this section were those released between the year 2000

varieties pre-coded with the letters H or KH that were developed by Kenya Seed Company and jointly by the latter and KARI, respectively. Similarly, Elgon Kenya markets two maize varieties for Olerai but they have only been credited with one of their own; the same applies to Faida Seeds. In order to avoid double counting, Table 3.4 refers strictly to "varieties released" and not "varieties being marketed" by the companies.

and 2013. Therefore, there could be more varieties and companies that are not captured in Table 3.4. Also, whereas the majority of the varieties have exclusive licensing, some have non-exclusive or open licensing and hence are commercialized by more than one company.

The other aspect worth noting is the difference in number of varieties commercialized by various companies; whereas some companies have commercialized only one variety during the period under consideration, others have commercialized over ten of the varieties. Moreover, more recent data from KEPHIS (2014) showed that maize seed is currently being produced by 16 companies (four being parastatals), sorghum by eight companies (three being parastatals), bean by eight companies (four being parastatals) and cowpea by six companies, two being parastatals (Annex 7.3). This implies that producers of maize seed have been decreasing while those of sorghum and beans have been increasing, probably because of lack of competitiveness in production and marketing maize seeds (see Section 3.2.3).

The potential demand for improved seed is still high since the current seed production (including imports) does not cover the crop area targets in the country (Table 3.5. When the seed companies were asked whether the Kenyan market has potential to accommodate new seed companies, 100% of the respondents answered in the affirmative. Some of the major reasons given in support of this potential include low outreach of farmers who need certified seed, frequent seed deficits, and changing agronomic challenges and consumer preferences. In terms of their opinion on the level of competition in the seed market (on a scale of 0 to 100), the mean score from all the seed companies was about 55%.

Table 3.5: Active seed companies and targeted crop areas

Crop	Number of seed companies	Total seed production and imports (Kg)	Area (Ha) currently served with certified seed	Total crop area (Ha) targeted	Percent of crop area served with certified seed
Maize	16	39,258,264	1,570,331	2,008,346	78.2
Sorghum	8	282,,829	35,354	225,782	15.7
Beans	8	694,704	17,368	689,377	2.5
Cow peas	6	423,772	21,189	168,273	12.6

Source: AgriExperience, (2014), KEPHIS (2014) and RoK, Economic Review of Agriculture (2011)

3.2.2 Seed imports and exports

In order to reduce threats arising from transmission of plant diseases and pests, the country has laid down appropriate internationally acceptable phytosanitary procedures for seed importation and exportation. Currently the country imports maize, sorghum and bean seeds in various quantities (Table 3.6) but it also exports small amounts of some seeds[5] (Table 3.7). Only the imports of beans (38.4%) of local production) are notably high. It was however established these bean imports are mainly for the horticultural sector. They include snap/snow peas and French bean

[5] Maize exports are just 1.2% of local production. It was not possible to estimate export percentages of the other study commodities due to the structure of data collected from KEPHIS (see Table 3.7).

seeds which are imported from the Netherlands and South Africa. The field survey showed that it takes about 40 days to import seed from parent companies, mostly based in South Africa. Most of the exports go to Burundi, DRC, Rwanda, Somalia, South Sudan, Tanzania and Uganda.

The main reasons for importation of seed for the four project crops are cheaper credit/finance and economies of scale on available facilities (research and processing) in parent companies located outside Kenya. One of the seed companies noted that the cost of credit in Southern Africa may be as low as half compared to Kenya. Multinational companies may therefore have a competitive edge over local companies on both technological and economic fronts. Seed imports are also influenced by the monopoly structure of the seed industry and market segmentation: the Public Seed Companies have a higher level of dominance in the high altitudes where it has more control over the maize hybrids suitable for this market segment while the imports are largely for the medium and low altitude regions where agro-ecological conditions are fairly similar to those of South Africa and India, for example.

Table 3.6: Annual seed production and import in tons (2013)

Crop	Local Production	Imports	Total (production and imports)	Percent imports	Sources of Imports
Maize	35671	3,587	39,249	9.1	Zambia, S. Africa, Zimbabwe
Sorghum	274	9	283	3.2	Zambia, S. Africa
Beans	428	267	695	38.4	France, Netherlands, S. Africa
Cowpeas	424	0	424	0.0	-

Source: KEPHIS data (2014)

Table 3.7: Annual Seed Exports of 2012

Crop	Quantity (kg)
Barley	60,000
Maize	443,862
Oil Crops	29,988
Pasture Legumes	50
Pasture/Lawn	3,995
Pulses	9,592
Sorghum/Millet	124,000
Vegetables	64,625
Wheat	1,596,600
Total	**2,332,712**

Source: KEPHIS Annual Report (2012)

3.2.3 Market share of top companies and distribution networks

Estimates of market share for project seeds

In determining the market share of seed companies, it is important to note that some farmers use own seed (saved from own produce) hence only the certified seed is considered. As indicated in Table 3.6, there exists a considerable difference between data provided by KEPHIS and estimates given by the seed companies. For all the crops, the figures given by companies are higher than the actual quantities of seed certified by KEPHIS. This implies that companies often sell more than what is documented by the government. The difference is likely to be due to carry-over stocks from previous years which were sold during the year under consideration. According to KEPHIS, the shelf life for the seeds is quite short (e.g. for maize a maximum of 2 years). For the purpose of this study, market shares were derived from production volumes recorded by KEPHIS in 2013. A key assumption related to use of production data in estimating market shares is that companies produce volumes that are reasonably equivalent to what they can sell. Going by such production volumes, company market shares for different crops have been estimated as shown in Tables 3.8-3.11.

Table 3.8: Market share of active maize seed companies (2013)

Rank	Company anonymous Identification code	Seed Production (Kg)	% market Share
1	11	28176829	72.73
2	2	4100000	10.58
3	18	1757186	4.54
4	21	1538577	3.97
5	17	1220914	3.15
6	3	480000	1.24
7	14	435066	1.12
8	5	428750	1.11
9	9	202150	0.52
10	13	139900	0.36
11	10	88967	0.23
12	7	74624	0.19
13	1	43496	0.11
14	19	34800	0.09
15	4	15877	0.04
16	15	4992	0.01
Total		**38742128**	**100.0**

Source: KEPHIS, 2013 data

Table 3.9: Market share of active sorghum seed companies (2013)

Rank	Company anonymous Identification code	Production (Kg)	% Market Share
1	2	85000	31.0
2	11	75512	27.6
3	4	32577	11.9
4	9	28420	10.4
5	21	27500	10.0
6	19	13000	4.7
7	13	6000	2.2
8	10	5820	2.1
Total		273829	100.0

Source: KEPHIS, 2013 data

Table 3.10: Market share of active bean seed companies (2013)

Rank	Company anonymous Identification Code	Production (Kg)	% Market Share
1	19	207738	48.6
2	4	94110	22.0
3	10	72792	17.0
4	11	29984	7.0
5	5	15261	3.6
6	6	4309	1.0
7	9	2250	0.5
8	13	1260	0.3
Total		427704	100.0

Source: KEPHIS, 2013 data

Table 3.11: Market share of top five cowpea seed companies

Rank	Company anonymous Identification Code	Production (Kg)	% Market Share
1	10	204889	48.3
2	5	93350	22.0
3	4	67169	15.9
4	19	57800	13.6
5	9	464	0.1
6	13	100	0.0
Total		423772	100.0

Source: KEPHIS, 2013 data

Given the importance of commanding a big market share, acquiring and retaining customers is an important objective for most of the firms. With one company having a market share of about 73% in seed maize, there is a high likelihood of engagement in anti-competition practices in the industry to either acquire or retain customers. Though Table 3.8 anonymously identifies this company as No. 11, interviews conducted with seed producers indicate that this is one of the PSCs. It is however important to note, unlike for maize, there is no company with over 50% of the market share for sorghum, bean and cowpea seeds. This may be because of the importance of maize as a food security crop in Kenya, which has made the government to invest heavily on its seed production over the decades.

Some of the observed anti-competition practices are prohibitive/restrictive contractual arrangements between breeders/research institutions and seed companies that restrict access to a given variety to only one seed company. This is mainly between government owned research institutions and companies that collaborate to jointly produce and own a variety, hence excluding

companies that were not part of the collaboration. For many years, all the varieties released by KARI were getting licensed exclusively to one PSC. The following concerns have been raised concerning these exclusive licensing arrangements:

a) Use of public resources and facilities to accord preferential treatment to one player in a supposedly liberalized market without any clear economic justifications, for example relating to economies of scale, food security concerns and protection of the interests of seed consumers
b) Controlling (subsidizing) prices of seeds marketed by one PSC leads to market distortions and crowding out of private investment, especially on R&D
c) According PSCs preferential treatment when sourcing for relief seed
d) Prescribing of mandatory seed dressing chemicals to be used by all seed companies while subsidizing the same chemical for the government controlled seed company

Inefficiencies in the distribution network

It was established that unlike breeder-to-seed company relations where there are restrictions, seed companies sell their seeds to agro-dealers at the lower end of the chain without exclusive contracts. Various agro-dealers choose which companies to stock seed for and may sell seed from many different companies. This is a positive aspect for competition because it provides each company with an opportunity to sell seed to agro-dealers located in all parts of the country. There is however one layer of collaboration among players that may lead to inefficiencies and conflict, namely, contractual arrangements between a seed producers and distributors. The latter, unlike the agro-dealers, tend to have a nation-wide network and should ideally be the first contact with seed producers.

The field survey established instances where the distributors also venture into seed production as part of business diversification and/or lack capacity to perform M&E as well as other promotional initiatives and post-sales services. Seed companies then find themselves in the awkward situation of directly dealing with agro-dealers who already have lose arrangements to sell products from the same distributors. The distributors complain of loss of trust and revenue while the seed companies argue that the distributors, especially those with their own varieties tend to neglect the producers' brands leading to lack of feedback from consumers and potential infringements of KEPHIS regulations such as expiry dates.

3.2.4 Ease of entry and exit

Seed companies are attracted into the Kenyan seed market by various factors such high demand for certified seed, high profit margins as well as a good distribution infrastructural network. Asked to state the most important factor encouraging entry into the Kenyan seed market, 56% of the respondents indicated market potential (demand) as the key force that attracts them to the Kenyan seed market, 11% indicated availability of good distribution network while 33% are motivated by high profit margins.

Alongside the factors that encourage entry, there are other forces that act as barriers to entry, among them: heavy investment requirement associated with the need for adequate and right research facilities (laboratories and equipment), the right germplasm with demanded traits, secure multiplication fields with adequate water, appropriate storage facilities and qualified staff. It was noted that entry into the Kenya seed market may demand up to KSh 60 million. This is compounded by lack of/or high cost of capital needed to finance the necessary operations. Another obstacle to entry into the market is inadequate awareness about the potential of the seed market. Factors which restrict entry will invariably constrain performance of the companies even after entry.

Immediate exit from the country seed market is mostly driven by lack of sales or low profit margins. Several factors were noted to hinder exit including the need to liquidate fixed assets, settlement of employees as part of lay off requirements and disposal of (destruction) of stock. Other factors that hinder exit are not easily quantified in monetary terms, for example, the time invested in developing new varieties and national distribution networks. On a scale of 0-10, the 16 seed companies ranked ease of exit at a higher level than the ease of entry (Table 3.12). For both entry and exit, private seed companies' rating was below the mean of the sample. This is an indication that they are not as happy as the parastatals with the existing conditions for entry into and exit from the seed market.

Table 3.12: Ease of entry into and exit from the Kenya seed market

Statistic	Ease of Entry			Ease of Exit			Level of satisfaction with competition		
	ASPs	PCOs	PSCs	ASPs	PCOs	PSCs	ASPs	PCOs	PSCs
Mean	64.1	59.6	77.5	85.9	83.8	92.5	55	48	76.3
Mode	70.0	40	-	100.0	90	100.0	80	50	80
Standard Deviation	24.0	24.9	17.1	15.2		9.6	24		80
Minimum	20.0	20	60.0	50.0	50	80.0	10	10	65.0
Maximum	100.0	100	100.0	100.0	100	100.0	80	80	80.0
Count	16	12	4.0	16	4.0	4.0	15	10	4.0

Note: ASPs=All Seed Producers; PCOs=Private Companies only; PSCs=Public Seed Companies/Institutions; AgExp= AgriExperience data

Source: Interview of seed companies

3.2.5 Level of competition in the seed market (the Herfindahl Index)

Status of competition

Given the prevailing structure, conduct and performance of the Kenyan seed market, it would require one to conduct an assessment using a commonly accepted measure of market concentration, the Herfindahl-Hirschman Index, usually abbreviated as Herfindahl index (HHI). In

essence, the index tells whether a large proportion of the market share is held by few or many players. Where there are many players each holding a small share of the market, the index will be small while in cases where few players control a bigger market share the index will be large. In general, the index ranges from approximately zero (pure competition where thousands or even millions of players are involved each holding a near zero percentage of market share) to 10,000 (perfect monopoly).

For purposes of this report and guided by the trends in market shares, we consider the top 16 active companies whose shares of the maize seed market could be reliably established by using KEPHIS data. The distribution of the market share among the 16 companies is as follows: 72.73, 10.58, 4.54, 3.97, 3.15, 1.24, 1.22, 1.11, 0.52, 0.36, 0.23, 0.19, 0.11, 0.09, 0.04 and 0.1. Thus the HHI for the maize seed market can be computed as:

$HHI=72.73^2+10.58^2+4.54^2+3.97^2+3.15^2+1.24^2+1.22^2+1.11^2+0.52^2+0.36^2+0.23^2+0.19^2+0.11^2+0.09^2+$

$0.04^2+0.1^2 =$ **5452**

Calculations similar to the one performed on maize gave HHI indices of 2106, 3196 and 3260 for sorghum, beans and cowpeas respectively. Comparing the four seed types, maize market is by far the most concentrated and by extension the least competitive followed by cowpeas, beans and sorghum. As a rule of thumb, HHI of less than 1500 implies un-concentrated market, 1500 to 2000 as moderately concentrated while above 2500 are considered highly concentrated. It therefore follows that although none of the seed markets show pure monopoly power (at 10,000), three of the seed markets (maize, beans and cowpea) are highly concentrated except sorghum which is moderately concentrated, meaning there is limited competition in all the four seed crops. However as Table 3.12 shows, about half (55%) of the seed producers are currently satisfied with the status of competition in seed market in Kenya. This rather favorable opinion on the level of competition seems strengthened by the fact that no one company has market leadership in more than one of the concerned seeds.

Factors influencing competition

The discussions in the foregoing sections provide a number of structure/industry organization and policy related factors that may adversely affect the level of competition in the Kenyan seed market. These, among others, are:

a) *Government involvement in the seed industry*

Though the seed market has been fully liberalized, there are both breeding and seed production institutions such as KARI and Kenya Seed Company (KSC), respectively, that have a considerable level of government support both in terms of funding as well as organizational policy direction. Other public seed companies/institutions (PSCs) include Egerton University Seed Unit, Kerio Valley Development Authority, Lake Basin Development Authority, Mwea Irrigation Agricultural Development (MIAD), Maseno University, Agricultural Development Corporation (ADC), University of Nairobi Seed Unit (Uniseed) and Simlaw Seeds. In particular, the involvement of government in selective provision of subsidized inputs such as seed dressing chemicals, skewed allocation of government tenders to public seed companies as well as price setting are likely to injure competition in the seed industry. One particular PSC (denoted as No.11 in this study) is highly dominant in the high altitude regions where it controls about 80% of the market share for maize seeds. This dominance locks out other private R&D investments that could lead to an increased number of seed varieties suitable for these regions thus raising the level of competition and possible price reductions for farmers. In the medium and low altitude regions, as already noted earlier, the number of seed varieties is much higher and industry is in consensus that the playing field is much more level and favorable. These observations however seem to be applicable only for maize and to some extent sorghum: beans and cowpeas have rather low rates of seed replacement ratios that disadvantage seed producers equally irrespective of size or government support.

b) *Marketing strategies and seed distribution networks*

The seed distribution networks are influenced by many factors including: seed types; contractual arrangements between distributors and agro-dealers; basis for pricing and discounts; regional dominance of varieties and source of that dominance (public support/subsidy and number of varieties); infrastructure and security. The more established companies and particularly those affiliated to the government have benefited from already established nation-wide distribution networks, and in some cases use of storage and distribution channels of NCPB. Discussions with the smaller seed producers indicate that the comparative advantage of some PSCs such as No. 11 include public funding and other state preferences. This has given the company a competitive edge in the form of more superior field staff and excellent marketing and advertizing strategies that cover the entire country up to the grassroots levels. Advertizing and wide distribution networks have helped this PSC to establish its brands firmly in the minds of farmers thus making the firm to be a worth competitor even in the medium and low altitude regions where the market is much more atomistic compared to the high altitudes

c) Access to seed varieties

Where the breeder has been a public institution, licensing has invariably been granted to public seed companies thus creating inequalities and unfavorable environment against other private sector players. Although this sort of exclusive licensing has been there in the past, it is slowly being dismantled. National research institutes such as KARI and public universities (notably, University of Nairobi and Egerton University) are now giving out their new varieties to a multiple of seed

companies. Similarly, seed producers are also accessing new varieties from regional initiatives such AATF and thus increasing the diversity of their sources and over-reliance on domestic breeding institutions.

d) Legal and regulatory procedures

A number of firms interviewed in this project were of the opinion that the legal and regulatory environment in the seed industry is too restrictive and thus a threat to increased competition. This however is an issue that requires round table discussion between industry players and government especially in order to rationalize why the state insists on keeping a firm grip on a liberalized market instead of fostering self regulation. Those interviewed complained mainly of three issues that are inter-related: compulsory seed certification; the long period it takes to go through the NPT and DUS procedures; and; state support of the PSCs and their operational linkages with NCPB which is also a state corporation.

3.2.6 Comparison of the crop seeds market with that for vegetables

Since this market inquiry targeted only grains that are considered important for national food security, this sub-section will only briefly highlight the main features that distinguish the horticulture seed sector from that of food grains. There are very many crops used as vegetables in Kenya that may be loosely categorized either as indigenous or exotic. Whereas the market for exotic seed has been largely organized and formal, the local vegetables have remained without formal or organized seed system for many years. This was until a couple of years ago when their nutritional value was widely publicized thus attracting the attention of both consumers as well as seed producers. Unlike the four market inquiry crops already discussed above, most of the exotic vegetable seeds used in Kenya are imported from Europe or America. For instance, of the 825,846 kg of vegetable seed sampled for testing by KEPHIS in 2011/2012, only 21% had been locally produced (KEPHIS, 2012).

For some vegetables (e.g. snap beans), the seed production and distribution is tightly controlled by the seed producers to the extent that seed is not available at agro-dealer level. All seed produced is directly delivered to particular farmers who then sell all the produce to contracted buyers most of whom focus on the export market.

The NCPB does not engage in seed imports hence there is no direct government involvement in the vegetable seed sector but it (government) supports research and development (R&D) at institutions such as KARI and public universities. The national horticulture policy produced in 2012 is the main blue print for the industry development and sustainability but a number of its planned interventions such as increasing horticulture productivity, increased use of irrigation and diversification of production areas to include ASALS are yet to commence implementation.

Unlike in the case of the four survey crops, support services to smallholder farmers have largely been through linkages and contractual arrangements with larger producers and exporters that in part provided extension services, quality control and credit. Such arrangements have however

come under serious threat following the sampling of Kenyan horticulture in the country's major European markets to determine if they violate the prescribed minimum residue limits (MRL). The MRL challenge has since been tasked to the Horticulture Competent Authority whose aim is to have a central notification and coordination structure on all phytosanitary standards in horticulture[6].

As in the seed market for the four market inquiry crops, KEPHIS is still the main regulator responsible for varietal certification for vegetable seeds while HCDA has been in charge of marketing and certification of export consignments. The new reforms under the Agriculture, Food and Fisheries (AFFA) Act however will see HCDA absorbed back in the Ministry of Agriculture, Livestock and Fisheries as a Directorate. The proposed restructuring will most likely water down the specialized services HCDA provided to small horticulture producers and may also bureaucratize certification and the working relations between the Directorate and other regulatory institutions.

The main consumers of exotic horticulture seeds are large private multinational firms that have supply links with smaller farmers, mostly in the Rift Valley and Central parts of the country. The valley chains for the indigenous vegetables are however well spread out in the country but the demand for seeds in this rather informal segment is mostly satisfied by local sources, including own recycled seeds, rather than imports. The interests of firms in the formal/export segment are catered for by the Fresh Produce Exporters Association of Kenya (FPEAK) and the Kenya Flower Council (KFC), with activities of members of the associations being guided quite closely by industry codes of practice that ensure adherence to phytosanitary standards. The industry, including the vegetable seed sector, is also supported at the continental level by the Horticulture Council of Africa (HCA). The Council aims to address common challenges and constraints such as competition and compliance with safety and standards that these countries face especially in the European markets. It is also active in organizing for sharing of information and technical skills as well as providing a common platform for negotiations on economic partnership agreements (EPAs) and at the WTO.

[6] In 2011, the Ministry of Agriculture set up a coordinating committee comprising: KEPHIS (to serve as the central notification point and chair of the technical committee in addition to core competence on all matters phytosanitary and residue testing); Pest Control Products Board, PCPB (responsible for testing, registration and regulation of plant protection products); HCDA (to undertake registration and development of the horticulture sub-sector); KARI (to undertake all research issues in horticulture); FPEAK (dealing with fruits and vegetable exports); and, KFC (dealing with export of flowers).

Table 3.13: Summary of industry competitiveness parameters

Variables	Indicator	Computation of indicator
Number of farm households per active seed company	301182	(No. of farm HHs)/No. of active seed companies =6324819/21
Number of active seed companies for:		
Maize	16 (total nationally)	Companies producing maize of any variety between 2009 and 2013
Sorghum	8 (total nationally)	Companies producing sorghum seed of any variety between 2009 and 2013
Beans	8 (total nationally)	Companies producing bean seed of any variety between 2009 and 2013
Cowpeas	6 (total nationally)	Companies producing cowpea seeds of any variety between 2009 and 2013
Length of time it takes to import seed from neighboring countries	41.2 days	Average from of time taken to import various seeds as indicated by various seed companies
Combined Market share of top seed companies (by turnover)	***%***	
Maize (top five companies)	94.9	Summation of shares held by top five companies -Table 3.8
Sorghum (top five companies)	90.9	Summation of shares held by top five companies -Table 3.9
Beans (Top five companies)	98.2	Summation of shares held by top five companies -Table 3.10
Cowpeas (Top five companies)	100	Summation of shares held by top five companies -Table 3.11
Number of contractual arrangements that lock agro dealers to one company	0	Summation of contractual arrangements as indicated by seed companies
Market share of current government state corporations in 2013	***%***	
Maize	73.1	Computation of market share as shown in Table 3.8
Sorghum	34.4	Computation of market share as shown in Table 3.9
Beans	73.6	Computation of market share as shown in Table 3.10
Cowpeas	62.0	Computation of market share as shown in Table 3.11
Ease of entry and exit	***Score out of 100***	
Ease of entry	64.06	From the ease of entry score as indicated by seed companies
Ease of exit	85.93	From the ease of exit score as indicated by seed companies

Source: Seed company interviews, 2013

3.3 Support services to smallholder farmers

3.3.1 Distribution of rural agro-dealers

According to data obtained from the Pest Control Products Board (PCPB), there are about 927 registered agro-dealers in the country. The number could however be much more if smaller agro-chemical shops had been included. The AgriExperience database, for example, gives a cumulative sum of more than 6,700 agro-dealer shops[7]. It is common in Kenya to find small towns and markets having more than one agro-dealer, commonly referred to as agro-vets, given their involvement in both agricultural and veterinary inputs. Most of the agro-dealers sampled for this study were found to be selling seeds. The few that were not were systematically replaced using the PCPB lists. From this database, the average number of agro-dealers in Kenyan towns is 13 and there are at least two agro-dealers in each town or market center with the busiest town (Karatina) having up to 60 agro-dealers within a radius of 2 km. Despite the relatively high number of agro-dealers in the country, farmers often travel 3 to 10 km to access the inputs (AGRA, 2010). Half of the agro-dealers did not perceive infrastructure as a hindrance to growth of seed business in their areas of business in spite of the poor state of access roads in rural areas. The regional spread of agro-dealer shops shows that Central Province has the highest concentration of agro-dealer shops with 186 registered shops (Table 3.14).

Table 3.14: Regional distribution of registered agro-dealers

Region	Number registered
1. Upper Eastern	143
2. Lower Eastern	89
3. Central	186
4. Rift Valley	133
5.South Rift/ Nyanza	66
6. Nairobi & Surrounding	175
7. Western	135

Source: Pest Control Products Board (PCPB), 2013

3.3.2 Availability of seed in small packages

According to the government's Agricultural Sector Development Strategy Program (ASDSP), smallholder farmers account for over 75 per cent of the total agricultural output and about 70 per cent of marketed agricultural produce. These are farmers with land sizes of about 0.2-3.0ha. Given the seed rate for different crops, such smallholder farmers may require small packages in order to minimize surpluses that may go to waste. Availing the right packaging of seed is therefore an

[7] The study used PCPB list of agro-dealers in order to target well established seed shops that also sell agro-chemicals and therefore operate throughout the year

important incentive to utilization of certified seed among smallholder farmers. It was found that most of the sales (about 74%) at the agro-dealer shops are done using 2kg packages (Table 3.15).

According to the prevailing laws and regulations, repackaging of seed by agro-dealers is illegal. Given the quality assurance measures put in place by KEPHIS, each seed package must have a KEPHIS label. Such labels are attached at the seed merchants (companies) packaging premises and not at agro-dealer level. Any repackaging done at agro-dealer level will therefore lack the required KEPHIS label hence not regarded as certified. Some of the agro-dealers interviewed stated that they repackage purely for the purpose of dividing seed among farmers who cannot afford larger quantities individually[8]. However, further investigations revealed that this may be just an argument for the sake of escaping victimization from government regulators.

Table 3.15: Proportion of sales for different package sizes

Crop	25kg	10kg	5kg	2kg	1kg	0.5kg
Maize	5.4	5.54	0.0	77.3	11.0	0.8
Sorghum	8.6	1.43	1.4	77.1	11.4	0.0
Beans	0.0	0.0	0.0	80.0	15.0	5.0
Cowpeas	0.0	0.0	0.0	80.0	15.0	5.0

Source: Agro-dealer interviews

[8] Illegal re-packaging of seed at the agro-dealer level, for whatever reason, is not easy to establish objectively. There are seed companies (e.g. Olerai Ltd and Elgon Kenya Ltd) that are already distributing seed in 1 kg or smaller packages. The seed companies maintain that repackaging is not allowed and can take place only in very special circumstances; for example, when the packages burst, or when they get damaged accidentally, in which case the seed company issues new packages and/or replaces the damaged stock.

Table 3.16 Summary of parameters on support service to smallholder farmers

Variables	Indicator	Computation of Indicator
Concentration of rural agro-dealer networks	6,823 farmers per agro-dealer (considering PCPB list)	(Number of farmers in Kenya)/number of registered agro-dealers
Availability of seed in small packages (e.g. 2kg or less for maize)	% of sales volume	
Maize (2k or less)	85	Proportion of seed sold in equal to or less than 2kg packets
Sorghum	88	Proportion of seed sold in equal to or less than 2kg packets
Beans	100	Proportion of seed sold in equal to or less than 2kg packets
Cowpeas	100	Proportion of seed sold in equal to or less than 2kg packets
Level of contractual flexibility for agro dealers to repackage	0	Agro-dealers not allowed to repackage seeds
Level of oversight/supervision on repackaging	0	Agro-dealers not allowed to repackage seeds
Implication of repackaging on cost	N/A	Not allowed to repackage, there is no cost implication associated with repackaging

3.4 Quality of seed policies and regulations

3.4.1 Variety release period

After the breeder has come up with the foundation seed, the time taken for a variety to be released is dependent on administrative as well as agro-climatic conditions in the trial area. Administrative constraints could arise from both the breeder and the regulator's actions. For instance, the breeder could delay in submitting information required by the regulator or the National Variety Release Committee (NVRC) could fail to meet as required, respectively. Considering the combined effect of both the administrative and agro-climatic factors, variety release period in Kenya ranges from 2 to 4 years for all crops, and in some cases, more; the average period, based on information from this survey, is 3 years. Data from private and public seed companies showed a mean value of 2.9 and 3.4 years, respectively for the release period

Table 3.17 Time taken to release a crop variety

		Time taken in Years		
Statistic	All Seed Producers data	Private Seed Companies data	Public Seed Companies data	AgriExperience data
Mean	3.0	2.9	3.4	3.1
Mode	2.0	2.0	3.5	-
Minimum	2.0	2.0	3.5	2.4
Maximum	5.0	5.0	2.5	4.0
Count	11.0	8.0	4.0	-

Source: Seed company interviews and AgriExperience data (2013/4)

From KEPHIS perspective, varieties have to undergo trials for at least two planting seasons for the NPT followed by an additional two seasons for the DUS process. Given the mandatory two seasons of trials, all crops take almost the same period to undergo regulatory compliance hence any difference in time taken by a particular case may be due to administrative or climatic conditions rather than crop species. Compared to say South Africa that only requires one season for DUS without a requirement for NPT, Kenyan breeders may spend four times more time on variety approval than their South African counterparts. This could partly explain why on average Kenya releases only about 25 new varieties per year compared to South Africa that averages between 60 to 80 new varieties annually. The time taken in Kenya is however shorter than that for Uganda which could go up to five years (Setimela et al, 2009).

3.4.2 Seed policy framework

The Kenya National Seed Policy came into force in August 2010. Given the relatively short period in which the policy has been in force, its effectiveness may not yet be clear to most stakeholders though the seed sector players see its enactment as an important and positive step especially as far as self-regulation is concerned. Self-regulation would allow the private sector to play some regulatory roles thus reducing the burden on KEPHIS in order to enhance quality assurance in the seed industry.

The policy document seeks among other things to:

- fully exploit the potential for improved varieties and technologies for increased agricultural and forestry productivity
- facilitate an effective regulation, coordination and management of all activities within the seed sub-sector
- build capacity and infrastructure within the seed sub sector to handle research and development, quality control, technology transfer, conservation/preservation of germplasm and emerging technologies such as GMOs and ICT
- create an enabling environment through legal and policy reforms for effective participation of both public and private sectors in the production of quality planting materials

- harmonize regional seed policies and regulations to enhance cross border trade in seed
- monitor seed supply and demand situation in order to ensure adequate strategic seed reserve

Following the launching of the National Seed Policy, the legal framework governing the industry (the regulatory framework) is being undertaken through amendments to the Seeds and Plant Varieties Act, Cap 326. The regulations to be amended relate to: i) The Seeds and Plant Varieties (Seeds) Regulations; ii) The Seeds and Plant Varieties (Plant Breeder's Rights) Regulations; and, iii) The Seeds and Plant Varieties (National Performance Trials) Regulations. The objective of the regulatory framework is to operationalize the provisions of the Seeds and Plant Varieties (Amendment) Act, 2013 and the Harmonized Eastern Africa Seeds Standards, Regulations and Procedures (HESSREP) Agreements. AgriExperience and STAK organized round table meetings bringing together seed producers (food security crops) in October 2013 and another one for public institutions in November 2013 in order to make contributions to the proposed amendments (Seed and Varieties Regulations Amendments Roundtable Meetings: Minutes for October and November 2013 Meetings at Sankara Hotel, Nairobi). Some areas of contention as far as the participants were concerned are summarized below:

a) Regulation of seed exports by the Cabinet Secretary (CS) for the Ministry of Agriculture when shortage is anticipated: industry requires more transparency in decision making and their increased involvement, in addition to CS getting advise on supply status from KEPHIS
b) There is excessive testing both in terms of the range of crops/seed varieties and criteria tested for (a methodological issue). This extensive testing demands too much of the limited capacity of KEPHIS. Industry contends that proper/detailed labeling will be sufficient for famers to make the right/informed choices, with government taking on only an advisory role. Some players read mischief in this so called excessive testing: to protect vested interests of government supported institutions/firms. From a public perspective, however, the broad-based testing is meant as a protection mechanism especially for smallholders who generally have little technical knowledge about seed varieties
c) The issues on the NPT process relate mainly to its necessity and the duration: industry is advocating for shorter periods (one season instead of two) and increased use of irrigation in order to avoid over-stretching the capacity of KEPHIS and/or scraping it altogether as happens in major seed producing countries such as Egypt and South Africa
d) The regulations call for fines that some stakeholders find to be too low while others advocate for stiffer penalties. Those opposed to higher fines argue that they encourage corruption (collusion between the officers and the offenders)

   There were other concerns relating to memberships of the industry players in committees and tribunals to be set up and operationalization of AFFA and the Crops Act 2013. But representation without a strong voice may still be a futility if the government continues to be part of the industry in the form of one singularly dominant seed company.

3.4.3 Seed regulations and enforcement system

The national seed law (Plant Varieties Act) has been reviewed a number of times with the most recent amendment published in January 2013. One of the key elements introduced in the Act is the leeway for the regulator to authorize some private persons to handle some of the functions initially confined to the regulator. This is intended to improve efficiency in the industry. In enforcing the law and the related regulations, KEPHIS relies on a range of interrelated instruments including condemnation of poor quality seed at field level, confiscation of fake seed and arrests and prosecution. According to seed producers, the adequacy of the available enforcement mechanisms range from 20% to 100% with an average of 67.15% for all the seed producers. The private companies put their satisfaction with the regulatory enforcement mechanisms at an average of 69% while the parastatals' satisfaction level was at 67%. This implies that the country has a fair enforcement mechanism in place. Despite this fairly favorable perception, seed producers indicated that most arrests are not successfully prosecuted due to weak investigations coupled with corruption within the national police force. It was further noted that KEPHIS has to call the police for any arrest to be made, meaning the suspects may find their way to freedom by utilizing the time lag between identifying the suspect and actual arrest (if at all) to either escape or destroy the evidence. This weakens the fight against fake seed.

3.4.4 Number of seed inspectors

The main seed regulatory agency (KEPHIS) employs hundreds of staff out of which about 60 of them (15%) are involved in seed inspections. To ensure effectiveness and efficiency in service delivery, KEPHIS has distributed inspectors to various sites including all formal border points and international airports. Also, KEPHIS may in consultation with the very active seed companies, set up a desk/office within their premises. According to AgriExperience, the private seed companies put satisfaction with the availability of inspection services at an average of 63.8%. Regarding KEPHIS as an institution, most of the seed producers were largely satisfied with the adequacy of services provided by KEPHIS. On a scale of 0 to 100%, seed producers' satisfaction with KEPHIS ranged from 30% to 100%, with an average of 75% for all seed producers while private companies and parastatals put their level of satisfaction at 76% and 74%, respectively. In special cases, depending on the activeness of the seed companies, KEPHIS may, in consultation with the company, set up a KEPHIS desk/office within the premises of the seed company in order to allow continuous monitoring, sampling and testing during the production and packaging process. This, to a large extent implies a fairly high level of regulatory service provision.

From the seed associations' point of view, KEPHIS as a regulatory institution had a satisfaction score of 77.5% while the adequacy of available enforcement mechanisms were rated at 72.5%. Stakeholders were of the opinion that KEPHIS should be given prosecutorial powers. This emanates from the fact the police who are charged with investigating, arrest and prosecution may not be very well versed with matters of seed so they may not adequately articulate the case against the suspect. However, interviews with KEPHIS revealed that the organization faces challenges such as inadequate staffing, lack of transport facilities to reach clients and a low functional harmony with

other state organs involved in regulation, particularly PCPB, county officials and the police[9]. KEPHIS scores its own performance at 70% implying that there is still room for improvement.

The inspection level by the regulators at the agro-dealer level was generally weak. None of the regulators (KEPHIS, HCDA, PCPB and Weights and Measures Department) inspected agro-dealers more than once per year; PCPB scoring the least at an average of 1.4 visits per year. Since the agro-dealers are not regularly inspected, stocking poor seed and illegal repackaging into small quantities may not be ruled out.

3.4.5 Efforts to stamp out fake seed

In this study, fake seed is generally described as seed that has not been certified by the responsible regulatory institution(s) but it is available among the agro-dealers in the market. Such lack of certification may be due to failure by the seed producer/importer to apply for and/or follow the due certification procedures. According to various stakeholders, including seed associations, the main sources of fake seed in Kenya is forgery of packages of popular seed brands by unscrupulous traders. This mainly happens during periods of seed shortages when desperate farmers are likely to scramble for available seed without much scrutiny of the quality. About 42% of the agro-dealers acknowledged having knowledge about the problem of fake seeds. Dealers directly affected by the fake seed problem were 23%. Maize, being the most popular certified seed, is the crop most affected by the fake seed problem. The agro-dealer survey indicated that the main suspected sources of fake seeds were other agro-dealers (36%); seed producers/distributors (29%); and hawkers or briefcase suppliers (29%).

It has been difficult for KEPHIS and other stakeholders to deal with the incidences of fake seed because detection of source is usually difficult. On average, KEPHIS indicated receiving about 12 cases of fake seed per year. To help address the fake seed problem, seed companies control production and distribution of their packaging materials.

Of the sampled agro-dealers, about 62% were of the opinion that the government is doing enough to stamp out fake seed. Probed to state why they thought government was doing enough to stamp out fake seeds, 43% stated the decreased number of such incidences as the key indicator of government efforts. But others (about 32%) gave their reason as "increasing number of inspections by regulators" which of course contradicts the fact mentioned earlier that none of the regulators visit agro-dealers more than once in a year. It is however possible that as much as visitation frequency of not more than once a year seems low, previous years may have witnessed much lower visitation frequencies. From the private seed companies' perspective, satisfaction with the government's effort to stamp out fake seed is quite low at 38.5%. The huge difference in opinion between seed producers and agro-dealers could arise from the fact that seed producers have a wider (national view) of the seed industry unlike agro-dealers whose trade may be confined to a small geographical area.

[9]To make any arrest, KEPHIS needs support from the police which may not be readily cooperative and may bring forward excuses such as need for facilitation.

Perceptions about fake seeds are confounded by the fact that it is the industry players themselves at fault and one cannot tell whether or not the respondent is simply faking innocence, considering that over one third of the agro-dealers were pointing a finger at "other" agro-dealers as the source of fake seeds. Further interrogation also revealed that some cases of "fake seed" are reported to agro-dealers by farmers after poor germination or lower than expected yields. The less than satisfactory crop performance may be due to bad weather conditions or poor husbandry rather than seed quality. It therefore requires a more in-depth study to isolate true cases of fake seed from weather related cases. This is beyond the scope of this inquiry.

To enhance efforts aimed at stamping out the vice, seed associations proposed the following:

a) There should mechanisms that ensure adequate availability of certified seed throughout the year
b) Seed companies should increase surveillance so that fake packages are identified in time
c) Ensure tougher penalties to the offenders
d) The code of conduct currently observed by members of STAK should be incorporated into law
e) KEPHIS should enhance awareness and training on identification of fake seed
f) Farmers should keep the packages even after planting to help trace the source of seed

Suggestions by agro-dealers for dealing with the problem are summarized in Table 3.15.

Table 3.18: Agro-dealers' suggestions on ways to stamp out fake seed

Suggested ways to deal with fake seed	Percent of agro-dealers
Regular inspections/monitoring/follow ups/strict regulations	36.3
Education/sensitization on new packaging and genuine seeds	14.8
Subsidize retail prices	10.4
License only certified dealers in the market/encourage purchases from genuine agro dealers	10.4
Enhance law enforcement/fines/penalties/arrest to perpetrators	9.6
Other suggestions (including minimizing political interference)	11.8
No idea	6.7

Source: Agro-dealer interviews, 2013

From the foregoing, it is apparent that the problem of fake seeds is influenced by a number of factors: inadequate seed supply during the planting seasons; lack of education and awareness among smallholder farmers combined with their desire to minimize cost of production thus falling for discounted prices for fakes; low capacity of the regulators that does not allow frequent inspections; lack of integrity in the industry, especially corruption among the law enforcement agencies; and lack of a comprehensive and integrated strategy for crop and pest management in the

country. With regard to the last point, it is noted that although there are a number of regulatory institutions, their functions and roles tend to be duplicative and discordant. Gaps in laws and corruption tend to exacerbate the institutional inefficiencies that unscrupulous agents take advantage of. Stamping out of fake seeds will therefore require close collaboration between state organs and the private sector (especially the seed producers and their associations) as well as increasing extension services and educational campaigns among the farmers and agro-dealers.

Table 3.19: Summary of parameters on quality of seed policies and regulations

Variables on Supportiveness of the Regulatory Framework	**Indicator**	**Computation of indicator**
Length of varietal release process	36 months	Average of time spent by various seed companies to have their varieties released after application to KEPHIS
Number of seed production/distribution programs	data not available	
Efforts to stamp out fake seed- e.g. i) Number of cases recorded; ii) Number of disciplinary actions taken (per year); and, iii) Time taken to respond to complaints	61.8%	Estimated as proportion of agro-dealers who believe that government is doing enough to stamp out fake seed
Adequacy of the seed standard (if present)- number of parameters e.g. safety, purity, etc	86.5%	Average Score of the seed standard as given by the seed companies
Frequency of regulatory awareness creation events per year (number)	3.0	Number of times KEPHIS holds joint awareness functions per year (As given by KEPHIS during the key informant interview)
Adequacy of the industry code of practice	79.6%	Average Score of the code of practice as given by the seed companies
Variables on regulatory capacity to address standards and industry integrity issues	**Unit**	
Number of regulatory institutions	1.0	
Adequacy of legislations (penalties and offences covered)	67.2%	Average Score of the adequacy of regulatory mechanisms as given by the seed companies
Inspection frequency per year	1.5	Average number of times agro-dealers were visited by KEPHIS per year
Number of inspectors/manpower	60.0	Number of KEPHIS personnel dedicated to seed inspections (given by KEPHIS)
Mandate of the regulatory institutions (e.g. adequacy of scope, prosecution powers)	75.9%	Average score of the regulator as given by the seed companies

Source: Seed Company interviews, KEPHIS discussions, Agro-dealer interviews, 2013.

3.5 Institutional support

3.5.1 Structure of agricultural extension services

Provision of agricultural extension service is mainly dominated by the public sector. Up to late 1980s, the public extension system was adequately funded but following the onset of structural adjustment programs (SAPs) that led to a freeze in public employment and reduced funding, agricultural extension services suffered in terms of both quality and numbers. Despite the NEPAD/CAADP that gave some impetus to agricultural investment/funding following the Maputo Declaration in 2003, Kenya's budgetary allocation to the sector has generally been static except in 2012 when it picked up partly due to huge provisions for irrigation and other initiatives targeting ASALs. Allocations to research and extension equally stagnated and although extension fared relatively better compared to research in the period 2004 and 2009 reputed as the era for "revitalizing agriculture", intensity ratios for the services remained close to a mere 1% of agriculture GDP (Ackello-Ogutu and Mburu, 2011).

Currently, the public sector ratio of frontline extension worker to farmers is about 1:1000 compared to the desired level of 1:400 (RoK, 2012a). The agriculture sector has continued its transformation towards more value addition and commercial orientation thus requiring more specialized extension services. The drop in numbers and quality of public extension services has in recent years attracted entry of other extension service providers (ESPs) to fill the lacuna created by the SAPs. These other ESPs include NGOs, CBOs, FBOs and private commercial who are either selling their agricultural inputs (chemical and seeds) or providing free extension services. However, supplementation by the private sector is too limited and not able to reach many needy farmers, especially in regions where provision of agricultural information is still regarded purely as a public good. Similarly, private sector extension services favor commercial enterprises rather than food crops such as maize and sorghum whose value/cost rations are generally low.

All the ESPs use a number of methods and approaches such as face-to-face discussions, field schools, radio/TV and pamphlets or brochures to reach farmers with the relevant messages. Farmers who use certified seed sometimes receive some limited extension services from the agro-dealers when purchasing inputs. Such extension services are however limited to the inputs the farmer is purchasing and may not be related to technologies farmers might be interested in. Although the non-public ESPs have enhanced access to extension services, lack of a regulatory framework as well as limited coordination often lead to entry of unqualified ESPs and dissemination of contradictory messages, particularly those related to seeds as noted in the National Seed Policy of 2010.

Interviews with seed companies showed that they employ very few extension personnel or sales representatives: on average, only 11 males and 3 females to cover all their areas of operation (Table 3.20).

Table 3.20: Number of extension officers/sales reps employed by seed companies

Statistic	*Male*	*Female*
Mean	11	3
Median	6	1
Mode	6	0
Minimum	0	0
Maximum	53	12
Sum	150	47
Count	16	16

Source: Seed Company Interviews, 2013

3.5.4 Presence and quality of national seed trade associations

Kenya has one main seed trade association, the Seed Trade Association of Kenya (STAK), which is an organization of seed merchants registered by KEPHIS to produce and/or market seed in Kenya. The association was formed in 1982 under the Societies Act to represent the interests of the seed sector and promote development of formal seed trade. It operated through volunteers until 1999 when an independent secretariat was set up. STAK's vision is attaining excellence in quality seed trade and related services through its mission of promoting the interests of seed trade membership by upholding standards in the provision of quality seeds.

STAK is mainly interested in industry-wide matters of representation rather than individual firm strategies. In addition to general and special meetings, STAK organizes industry wide annual congresses as well as other events such as seminars and symposia. Although the members account for only half of the registered seed merchants in the country, they sell over 90% of the certified seed[10]. This implies that members of STAK are the most vibrant players in the seed sector.

Other than STAK, there are associations such as the Plant Breeders Association of Kenya (PBAK) that mainly facilitates members to secure Plant Breeders Rights and the Cereal Growers Association (CGA) whose aim is to bring all cereal farmers together for collective action to ensure sustained improvement to their farming enterprises. In addition, there is the regional Africa Seed Trade Association (AFSTA) that also offer services aimed at promoting seed trade in Africa. Most of the seed related issues are however handled by STAK which also happens to be the custodian of the Kenya seed trade code of conduct. Because most seed producers are not directly linked to these additional associations, STAK remains the most important association; PBAK, CGA and AFSTA are

[10] STAK has two main categories of membership, namely Ordinary and associate members. Within ordinary membership there are three sub-categories depending on sales turnover. The highest category has three votes and pays KSh 340,000 per year while the second (medium) has two votes and pays Ksh 210,000 per year. The last (lowest in turnover) has one vote and pays KSh 170,000. Associate members on the other hand need not be directly involved in seed trade; they could be providers of agricultural services that in one way or the other relate to seed production and/or trade. Unlike ordinary members, associate members have no voting rights; they also pay a lower fee of KSh 70,000 per year.

all members of STAK. The seed producers rating of the activeness, effectiveness, managerial ability, democracy, capacity and resource mobilization attributes of seed associations is however only marginally favorable; they rated rather poorly on advocacy and capacity to mobilize resources (Tables 3.21 and 3.22).

Table 3.21: Quality of seed associations (from all sample seed producers)

Indicator	Activeness	Effectiveness in advocacy	Managerial ability	Democracy	Capacity to mobilize resources	Mean Score
Mean Score out of 100%	67	58	70	75	59	65
Minimum	50	30	50	50	30	42
Maximum	90	85	90	100	80	89

Source: Seed Producer interviews, 2013

Table 3.22: Quality of seed associations from the perspective of private companies

Indicator	Activeness		Effectiveness in advocacy		Managerial ability		Democracy		Capacity to mobilize resources		Overall Mean Score	
	PCO	AgExp	PCO	AgExp	PCO	AgExp	PCO	AgExp	PCO	AgExp	PCO	AgExp
Mean Score out of 100%	65.5	51.4	58.3	43.6	72.2	55.0	75.6	53.1	57.8	49.2	65.9	49.3
Minimum	5	2	30	0	550	20	50	0	40	20	44	0
Maximum	90	70	85	70	90	80	100	100	80	70	89	80

Table 3.23: Summary of parameters on institutional support

Variables	Indicator	Computation of indicator
Number of extension officers per 1000 farmers	1	Data provided by government
Number of National Seed Associations	1 (STAK)	Data obtained from seed companies
Quality of National Seed Associations - (activeness, effectiveness in advocacy, governance, etc)	65%	Scoring as done by seed companies – see Table 3.21

Source: Seed Company Interviews, 2013

3.6 Impact of National Cereals and Produce Board (NCPB) in the seed sector

3.6.1 Historical background of NCPB

The NCPB was established by the government of Kenya in 1979 by merging the Maize and Produce Board with the Wheat Board of Kenya in order to streamline the management, handling and marketing of all grains. In 1985, NCPB Act (Cap 338) was enacted thus making NCPB a corporate monopoly with powers to purchase, store, market and generally manage cereal grains and other produce in Kenya under a controlled price system. Due to increased grain production, the cost of managing such a subsidized system turned out to be a heavy burden on the government. This necessitated reforms and restructuring of NCPB to improve operational efficiency.

The reforms in the cereals sector commenced in 1988 and were effected mainly under three programs, namely: Cereal Sector Reform Program (CSRP) between 1988 and 1990; total liberalization of the grain market as part of the overall macroeconomic policies agreed with the IMF/World Bank between 1991 and 1994; and, NCPB Commercialization Reform Program between 1996 and 1998. Substantial implementation of policy reforms towards liberalized markets started in earnest in 1993 and focused mainly on the removal of movement restrictions on maize, rice and wheat marketing by reducing the monopoly of the NCPB as the official marketing agency.

The implementation of the reforms in the early period was not smooth and was characterized by considerable official ambiguity and at times covert resistance. This resistance could have derived from the mind set among the civil servants, the majority of whom subscribed to the view that the public sector should be the provider of services and facilities that official policy prescribes. The restructuring of NCPB was thus shrouded in poor policy implementation and reversals in the food crops sub-sector. More often than not, market deregulation was not followed with reform of the requisite legislations, resource allocations and institutional capacity building especially among the cooperatives.

3.6.2 Roles of NCPB and its impact on seed sector

The full liberalization of the grain market opened a window for NCPB to engage in commercial business roles. In addition to the commercial operations, NCPB is occasionally contracted by the government to deliver on certain social roles that may not be transacted at commercial rates. The mandate of NCPB currently includes the following roles:

1. *Commercial grain trade:* after liberalization of the grain market and subsequent reforms, NCPB now engages at commercial trading in various grains which it buys and sells at market rates. This however is in addition to other tasks as may be assigned by the government
2. *Social functions:* as one of the social (non-commercial) roles, NCPB procures and maintains a Strategic Grain Reserve (SGR) stock of up to four million bags on behalf of the government.

The stock may be released on instruction by the government in case of any shortage in grain supply. The SGR stocks are periodically replaced to ensure that the stock is fresh and of good quality. The other social function is procurement and distribution of subsidized fertilizer to farmers

3. *Third party services:* NCPB offers the following services within its network of depots and silos countrywide: weighing, drying, pest control, clearing and forwarding, grading, spraying, conveying, bagging, warehousing, aeration of stored grains, grain cleaning, aflatoxin testing, loading/off-loading, sale of seedlings, space for sun drying and hire of tarpaulin

Despite the wide distribution network and storage facilities, NCPB has suffered from poor management (and at times, claims about rampant corruption in its operations), intransigence on the part of government regarding specific strategies on official market interventions, and lack of food policy consistency and predictability. But as a market regulator, the Board also faces challenges that are purely economic, particularly the weaknesses of price legislations where the mandated institution is not a monopoly. For example, the Board's objective of ensuring price stabilization and food security in cereals is not always realized partly because of high operational costs and managerial problems that led to inefficiencies in delivery of services to farmers and delayed (or unreliable) payments. As a result, prices in surplus maize producing areas often fall below average costs of production or those deemed by government as "fair" to farmers while those in deficit areas often rise above what is affordable by the consumers.

Because NCPB basically deals only with, or attempts to regulate, cereals prices, its target is usually the large scale producers in the North Rift (Uasin Gishu and Trans Nzoia) who tend to have political clout. This raises questions of social equity: for example, timing and targeting of subsidized fertilizer; benefits of NCPB to other regions or non-food crop producers such as pastoralists and fisher folks.

In performing the functions highlighted above, NCPB may positively or negatively affect the operations of the seed sector. The most direct positive impact NCPB has on the operations of the seed market is related to the agency arrangements it has with some seed companies. By end of 2013, NCPB had acquired agency arrangements with one PSC and one private seed company to stock and distribute their seeds. Given that NCPB has branches and silos all over the country, such an arrangement may enhance availability of various seed varieties from these two companies to most parts on the country (Figure 3.5). Although this is a noble undertaking since seeds reach many more farmers in the country, the two seed companies accorded a competitive advantage over the other players in the market. In the arrangement, NCPB earns a commission from the sales but the seed stocks remain the property of the seed companies such that incase seed in not sold in good time, the seed companies collect the unsold stock for disposal. It was however clarified that the agency relationship is open to other willing seed companies as well. The agency does not therefore create any form on anti-competition or discrimination but companies that take up the opportunity may have a distributional advantage over those that shun it. This is particularly so given that poor

infrastructure and limited distribution network were expressly identified by seed producers as constraints in the Kenya seed market.

The other positive effect of NCPB functions on seed market is of an indirect nature. In its provision of market for cereals, NCPB indirectly motivates farmers to grow more cereals and hence purchase more seed. This is also the case with the function of distributing subsidized fertilizer: it is likely to enhance uptake of seed when delivered on time and in adequate quantities. Moreover, interviews showed that farmers delivering produce to NCPB often have the advantage of using the same means of transport to carry seeds home on their return trip.

Some of the roles and functions of NCPB, however, have negative impacts on the seed market. These include delayed payments to farmers which in turn adversely affect farming operations and ability to purchase seed. Another negative impact is associated with farmers' reliance on the NCPB supplied fertilizer. Sometimes NCPB fails to deliver fertilizer on time and in some cases it (fertilizer) is not adequate. Given the low fertility of soils in most of the agricultural areas, lack of fertilizer may discourage farmers from planting and this can lower demand for seed.

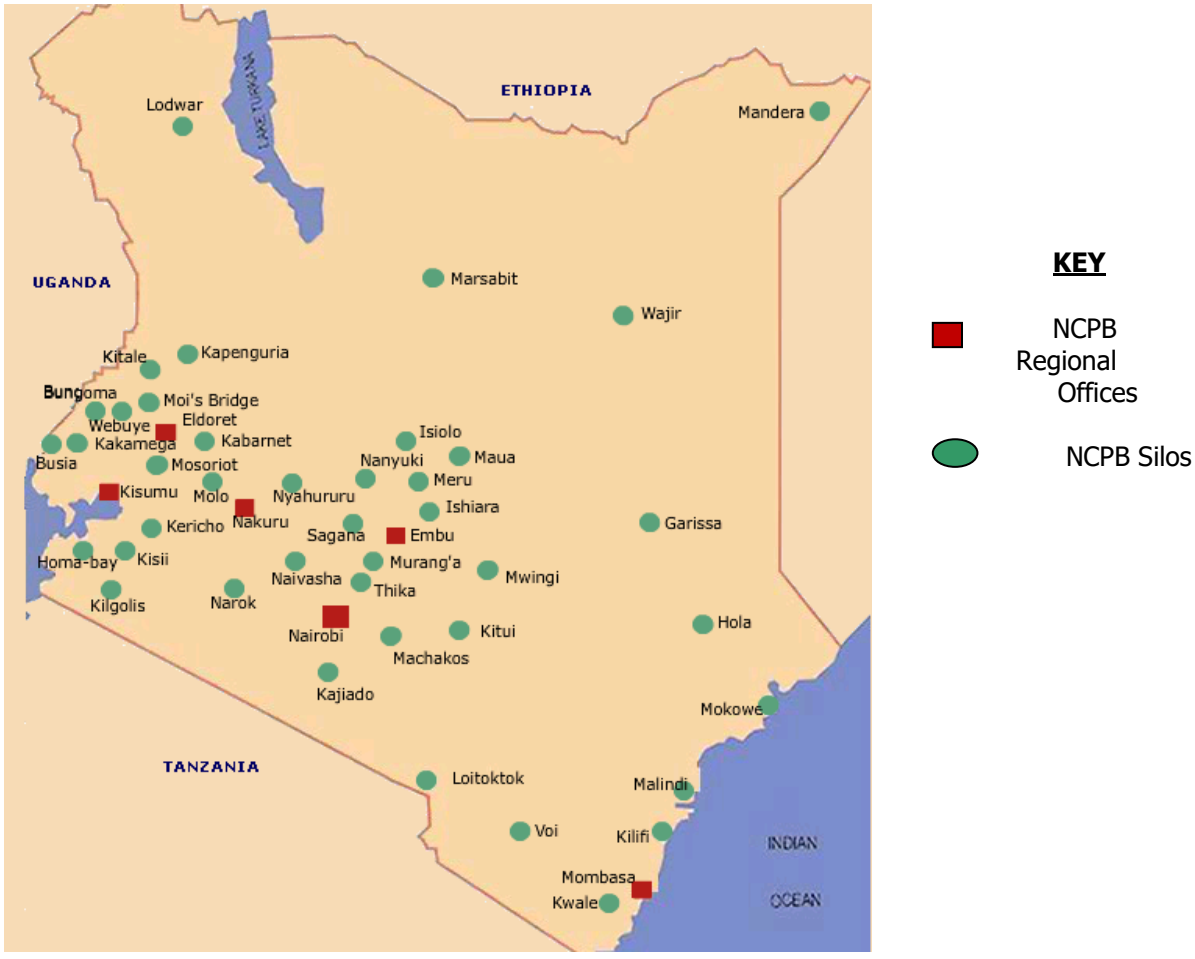


Figure 3.2: Network map of NCPB outlets

3.6.3 Overall opinion on performance of NCPB

Despite the various indirect positive effects NCPB functions have on the seed industry, stakeholders scored its performance at 36%, meaning the way various functions are delivered is generally poor. Some of the constraints pointed out as leading to this poor performance included:

- *Relying on government funding*: though government is one of the highest spenders in the economy, political factors may limit consistency and predictability hence making it difficult for NCPB to plan appropriately
- *Delayed payment:* given that farmers rely on the funds received from produce to purchase inputs for the next season, any delay in payment negatively affects farmers' operations and the negative effects ripple along the whole value chain
- *Too stringent quality requirement:* it was argued that there are times, especially during bumper harvests, when NCPB rejects produce unfairly. There is also no grading of grains. Thus all grades are bought or sold at the same price
- *Effect on competitiveness*: purchasing or selling grains at fixed prices negatively affects the competitiveness of the NCPB and the whole gain sector

To address some of the above constraints, it was suggested that there should be grading of cereals so that grains delivered to NCPB can be bought at different prices. It was also suggested that NCPB should plan its purchase targets early enough and announce the purchase price in good time. To address delayed payment, stakeholders were of the opinion that the government should avail funds both for grains and fertilizer well ahead of time and that NCPB should focus on purchasing and selling of produce and drop functions related to sales of inputs such as seeds and fertilizers.

4.0 Conclusions and policy implications

To identify hindrances to competition and consumer protection issues, the study looked at various relevant parameters and arrived at the following conclusions:

Research and development (R&D)

The R&D budgetary allocations in the country have stagnated for many years and the key research institutions, despite their linkages to international research centers and support from development partners suffer from brain drain. This in turn has led to low numbers for breeders and crop varieties available in the seed market. Maize is the main focus of breeding judging by its relatively high number of varietal releases compared to the other study crops (beans, sorghum and cowpeas) which are also relevant to the national food security strategy. Accessibility to foundation seed depends on the seed company and crop variety in question but generally did not pose major constraints.

There are only a few public seed companies or institutions with capacity for R&D, These include, among others, KARI and Kenya Seed Company. University of Nairobi has also this capacity, though,

despite its comparative advantage in staff numbers currently concentrates only on breeding for beans. Egerton University has also invested a lot in R&D but it is operating below its potential, judging by the number of seed varieties released in the last ten years. Private companies such as Monsanto, SeedCo and Pioneer rely on R&D resources based in their parent countries. There are concerns that potential investment in R&D is being crowded out by government's policy of supporting one PSC which has dominance especially in the high altitude maize growing regions. A number of new entrants to the Kenyan seed market therefore prefer to undertake breeding work in foreign countries with medium and low altitude agro-ecological zones that are similar to those of Kenya (e.g. South Africa and India). This denies the country not just the direct investment opportunities but also the synergies such R&D would have with local institutions such as universities.

Competition in the industry

Kenya imports maize seed, and to some extent seed for sorghum and vegetables. The importation process takes over 40 days, a duration considered by industry players to be too long and thus likely to impact negatively on cost of seeds to farmers and production logistics and efficiency. The study established that in maize, one seed company controls up to 78.9% of the market while in each of the four crops, the top two companies control over 50% of the market Notably one of the top two companies for each of the crops is a public seed company or parastatal (PSC). Such "skewed" distribution cannot be expected to be effective in enhancing efficiency and consumer welfare in the seed sector and particularly when the government is directly involved.

For the four study crops, it was established that the one PSC, that is 52% government-owned, has a very wide leadership in maize, is ranked number two in sorghum and number four in beans, where its subsidiary company has the highest market share. It was also established that the same company collaborates with NCPB in seed distribution, using the name and country-wide infrastructure (e.g. stores) of the latter. There are no regulatory encumbrances to entry into the Kenyan seed sector but perceptions about low levels of profitability and the dominance of state supported players may be locking out potential investors. Those keen to remain in the sector point to the following incentives: a) relatively low levels of seed use, especially among the smallholders and for crops such as beans which have low seed replacement ratios; b) government plans to support irrigated crop production in ASALs and regional integration (opening of boarders with agriculturally rich neighbors such as Uganda, South Sudan and Tanzania) as opportunities for future expansion; and, c) government efforts under agricultural sector development strategy (ASDS) aimed at increased agri-business development and commercialization.

Monopolistic tendencies have been adequately demonstrated in this survey. However, the way forward regarding government support to PSCs should consider the following dimensions, some of which go beyond our terms of reference:

a) Whether the size of the seed market (currently about 30,000-40,000 tons for maize and its projected growth domestically and regionally) raises questions of viability of a more atomistic structure. That is, would more competition raise or lower operational costs and prices paid by farmers and what would be the implications to food security? A more

nuanced answer to this question requires economic analysis of seed production and distribution and demonstration of existence or lack thereof of economies of scale. At this stage one must seriously consider support of monopoly of PSCs as part of a strategic policy decision anchored on national food security and equity goals that may not be achieved through a profit oriented competitive market. The industry players, nonetheless must challenge the government to provide clarity and rationale for support of monopoly

b) Whether government's divestiture from certain PSCs would spur more entrants and investments to the seed sector. Despite the PSC dominance especially for the long maturing maize hybrids, the majority of the seed producers in the survey sample stated that not only are there few obstacles to entry, the growth potential remains highly attractive especially in the medium and low altitude regions where the smaller companies are not particularly disadvantaged (they have a more level playing field)
c) The concerns about monopoly powers of PSCs implicitly surround the maize seed varieties and not with regard to sorghum, cow peas and beans which have relatively low seed replacement ratios (SRR), currently no more than about 5% for beans compared to an ideal of about 20%. The implication is that actions taken to address monopoly powers of PSCs must be holistic and not merely confined to maize
d) The main concerns in the seed sector may not be competition (atomicity) per se but rather strengthening of the regulatory capacity to address issues to do with industry integrity (e.g. fake seeds, a vice partly associated to demand spikes arising from over-reliance on rain-fed production). It is also necessary to beef up the breeding capacity to ensure availability of genetic materials that match the country's wide agro-ecological diversity.
e) Lessons should be learned from the vegetable seed sector which industry players unanimously consider to have a level playing field: the key factors for this sort of equity in the market is level of commercialization, profitability and knowledge base of farmers. Can these attributes be emulated in the food security seeds sector, especially with increased smallholder access to new production technologies and markets?
f) Cognizance should be taken of the impact of the proposed reforms in the agriculture sector (especially with some finesse in the implementation of ASDS and AFFA) and devolution of some services to the counties. What form will the industry regulatory structure take and what will be the implications to national government support to one seed producer in the market?

Based on discussions with major seed producers that largely market brands of seed producers but with others venturing into their own seed varieties), it is concluded that the distribution model in Kenya is somewhat inefficient and inimical to functional specialization. The following issues need to be addressed by the industry players and their principle association (STAK):

a) Seed producers rarely have firm contractual agreements with distributors and agro-dealers
b) Forward buying is rarely practiced
c) Volume discounts do not seem to be attractive to agro-dealers;
d) Seed companies also double as distributors of their own products thus creating conflicts with assigned distributors, usually on grounds that the latter and their assigned agro-

dealers do not effectively perform promotional functions for the brand names other than their own (if they have them)

e) Minimal use of ICT strategies e.g. for stock tracking/management in collaboration with KEPHIS in order to minimize losses arising from expired seeds

f) Elimination of some of the entry barriers such as poor infrastructure, high energy costs and insecurity in some of the regions

Support services to smallholder farmers

Due to the wide rural agro-dealer network, most of the smallholder farmers are able to access certified seeds. However, the agro-dealers as well as the seed companies they represent offer limited additional services such as extension and other technical support. In view of declining government support to extension and the rising number of agricultural households and seed merchants, farmers may be confused by the flurry of advertising and promotional campaigns aimed at raising sales rather than building their (farmers') capacity. The information provided may not adequately equip the farmer in terms of choice of variety and the required agronomic practices. Indeed some industry players contend that there should be more detailed labeling of the seed packages but this notion appears to be a quid pro quo for elimination of compulsory certification that is contained in the current seed regulations.

For all the four study crops, there is a tendency of selling seeds in small packets which are generally authenticated by the seed companies and regulators. Although there is consensus among the seed producers that they do not allow agro-dealers to re-package their seeds, there are isolated cases where agro-dealers engage in illegal repackaging in the name of dividing seed among farmers. This unauthorized form of repackaging was not easy to quantify in this survey. There are fears, however, that it can increase the chances of "adulterating" certified seed with fake ones.

Quality of seed policies, regulations and institutional support

Considering the combined effect of both the administrative and agro-climatic factors, variety release period in Kenya ranges from 2 to 4 years with an average period is 2.9 years. Though this is better than in some countries such as Uganda which may take up to five years, it is still much longer than say South Africa which only takes one year for maize hence the country is able to release between 60 to 80 new varieties each year.

The study also assessed the seed policy regulatory framework which covers seed laws, guidelines and the general policy direction among other related regulatory structures. Apart from the monopoly powers and government subsidies through the PSCs, industry players are also concerned about what they consider to be "over-regulation" of the seed sector. This sentiment derives from the recent reforms in the agriculture sector that have seen gazetting of a number of new Acts such as Crops Act 2013, Agriculture, Fisheries and Food Authority Act 2013, Kenya Agricultural and Livestock Research Act 2013 all of which came at the same time as devolution of a number of agricultural services such as extension and reduction in line ministries from 44 to 18. It is not clear yet how these reforms will impact on the seed sector but some players are already pointing at potential policy conflicts (particularly with regard to status of the Seeds and Plant Varieties Act Cap

369 following enactment of AFFA and whether KEPHIS will fall under AFFA) and compromises in efficiency of service provision.

One of the policies directly targeting the seed sector is the Kenya National Seed Policy which came into force in August 2010. It was hoped that the policy would among other things help the country to fully exploit the potential of improved varieties, facilitate effective regulation of the seed industry and create an enabling environment for effective participation of both public and private sectors in the production and utilization of quality seeds.

In addition to the seed policy, there is also the Seed and Plant Varieties Act and associated operational regulations that guide the seed industry. The main enforcement organization is KEPHIS which also registers the seed companies. About 15% of all KEPHIS staff are involved in seed inspection work but this allows them to inspect agro-dealers, on average, only once in a year. This may create room for unscrupulous agro-dealers to sell fake seeds to unsuspecting farmers immediately after the first visit with the confidence that it will be long before inspectors return.

Seed producers were generally satisfied with the adequacy of the regulatory enforcement mechanisms in deterring unwanted mal-practices and encouraging the desired behavior. Responses ranged from 43% to 100% with an average of 72% (where 0 is not effective and 100% perfectly effective). KEPHIS receives about 12 cases of fake seeds per year while about 23% of the agro-dealers reported having received complaints of fake seed. Discussions with KEPHIS revealed that they are concerned about industry integrity; touching on issues of fake seeds and brief-case merchants and the need for farmer and agro-dealer training and access to information

Of the sampled agro-dealers, about 62% were of the opinion that the government is doing enough to stamp out fake seeds. Genuine seed companies depend on their good reputation for sales hence are less likely to engage in the fake seed business under their name. The industry players are aiming at ensuring that seed is packaged in different sizes to discourage repackaging which would otherwise open up avenue for seed adulteration. The industry also encourages farmers to keep the packaging of the seed they buy and plant to enable traceability in case the seeds fall short of expectations.

But notwithstanding the above considerations about the ability of KEPHIS to address the issue of fake seeds, the following issues touching on its capacity and legal environment appear not to have been addressed to the satisfaction of some industry players:

- Why it is necessary to have compulsory certification of seed varieties
- Why the NPT process in Kenya takes about three years compared to countries like Ethiopia (one season with testing in at least 6 sites), South Africa, India and Tanzania (where there has been significant reduction in the certification period)
- Whether government and by extension, KEPHIS, is able to guarantee seed quality considering human capacity and budgetary challenges the regulator faces in addition to the fact that there is no law that requires that seed varieties, if imported, originate only from countries that also administer compulsory certification

- The extent to which a strong industry voice, and hence realization of the full potential of self-regulation, is being stifled by a government supported dominant player; this touches on issues to do with industry sustainability

It was found that stakeholders have high confidence in KEPHIS, the main regulator of the industry. The sector is likely to grow if KEPHIS maintains its national advisory role in order to ensure companies achieve the required quality standards without major losses arising from condemned seed. As the country expands its seed market to cover other regional countries, KEPHIS will be the basis of confidence by consumers in these and other emerging markets. Devolution is likely to over-stretch the services of the regulator but geometrical expansion may not be the answer to the human and financial capacity challenges it engenders but rather increasing efficiency in management, for example through increased use of information and communication technology.[11]

Impact of the functions of NCPB on the seed sector

The review of the roles of NCPB given in sub-section 3.6.2 of this report points to two sets of weaknesses: those that are due to operational inefficiencies at NCPB and partly arising from lack of consistency in food policies; and those that are inherent in the liberalized food crops sector, where the Board is no longer a dominant player in terms of control of a large share of marketed produce. Although the grain millers which government aimed at crowding into the sector continued facing challenges regarding government interference, or market distortions created by commercial activities of NCPB and policy unpredictability, the efficacy of NCPB as a price leader has diminished drastically as has its share of farmers' marketed grain sales that currently stands at less than 20%. The Board is mandated to source and distribute fertilizer under government's subsidy programs but it no longer engages in grain imports and exports as part of its price stabilization function as this has since been taken over by the private sector. The Board also does not engage in imports of seeds.

NCPB does not engage itself directly in the seed market but rather by availing its distribution networks and warehouses to seed market players. This working relationship was initially offered only to one PSC but is now apparently open to other interested non-public seed producers. The Board can therefore be deemed to be playing only facilitating roles, as follows:

a) As a major player in the grains sector and being mandated to handle subsidized fertilizer, the Board can potentially influence demand for seed by farmers, particularly considering its wide distribution networks in the country; but this potential impact is somewhat tempered by the fact that it does not reward farmers' investments in high quality seeds for example by paying a premium for high grade and uniform grains delivered to its stores.
b) The role of NCPB as an agency in seed distribution partnership is now open to other private seed producers. However, apart from the PSCs only one private company is partnering with NCPB. It is not clear if the use of the distribution network of NCPB confers significant unfair advantage to recipients as analysis of this subject transcends our terms of reference.

Seed producers' views about NCPB generally suggest that the Board currently does not impact one way or the other on their operations in the seed sector. However, in the context of AFFA and Crops Act 2013, there is a likelihood of duplication of functions considering the mandate of NCPB as a

[11] Based on discussions with KEPHIS in February 2014 regarding their future plans for improving services

"buyer of last resort" and custodian of the "strategic reserve" for national food security. It is indeed curious that seed distribution and price support are not part of the Board's core functions.

5.0 Recommendations

The main concerns arising from the market inquiry can be summarized as follows: low number of active breeders compared to the population of farmers; slow process of varietal release; low number of active seed companies and market dominance by less than four of them; low number of seed varieties in high altitude regions; low private sector investments in R&D; inefficient distribution networks; over-regulation of the industry; increasing cases of fake seeds in the market; and, potential conflicts and duplication of roles of NCPB in the context of AFF and the Crops Act 2013. In order to enhance competition and consumer protection in the Kenyan seed sector, the following interventions are recommended:

a) The number of seed varieties in the market has some degree of association with or influence on the level of competition. In the case of maize, for example, the market inquiry established that in the medium and low altitude regions where there are more varieties, the playing field is fairly level (less concentration) compared to the high altitudes. It is therefore recommended that: i) the government encourages more breeding programs by stepping up its budgetary allocations to breeding work especially in the high altitude regions and for crops such as beans, sorghum and cowpeas for which availability of foundation seed was rated poorly at between 67% and 78% compared to maize that was rated at 90%; ii) the government considers the possibility of availing some of the public land for seed production e.g. under the proposed Galena irrigation project; and, iii) more efforts be directed towards increasing production of seeds for other food security crops (particularly sorghum and beans) instead of concentrating just on maize

b) There are concerns that the high concentrations in the industry (monopoly powers) are stifling investments in R&D. For example, foreign firms that would otherwise invest in R&D (e.g. in breeding) are simply importing their varieties and going through the NPT process administered by KEPHIS. This denies the country the opportunities in direct investments and related employment opportunities, research infrastructure and the potential institutional synergies that arise for example from human capacity building. Efforts should therefore be made to attract private sector R&D investments to complement government's efforts under its on-going reforms, especially the Kenya Agricultural and Livestock Research Act 2013 and the Comprehensive African Agricultural Development Program (CAADP) whose goal, among others, is to raise national budgetary allocations to agriculture, including research and extension

c) Lessons should be learned from the vegetable seed sector which industry players unanimously consider to have a level playing field. The key factors for this sort of equity in the market are level of commercialization, profitability and knowledge base of farmers; attributes that could easily be emulated in the food security seeds sector, especially with increased smallholder access to new production technologies and markets

d) Varietal release process should be streamlined with a view to reducing the time it takes as is already happening in countries like India and South Africa. Both the NPT and DUS procedures could be done concurrently to reduce the time needed for regulatory evaluations. However, the bigger issue here is the yield standard that companies are using – focusing primarily on beating the "check" varieties in yield, even if the purported value of the new variety is related to something other than yield, such as fodder value, early maturity, etc.

e) Issue to do with industry integrity were addressed in this market inquiry, especially with regard to rising cases of fake seeds which require not just collaboration among law enforcement agencies, KEPHIS and seed producers but also aggressive educational campaigns for agro-dealers and farmers. Industry players are generally happy with the services offered by KEPHIS in terms of its functions but there are questions emerging about its capacity to deal effectively with all aspects of its regulatory mandate and whether some of its functions are indeed necessary. Some seed producers that were interviewed insist that KEPHIS is over-regulating the industry. Since the rationale for regulation can take many different forms, including lack of information, the consultant has not favored any side in the debate and instead recommends that stakeholders and government convene consultations on the following pertinent issues: a) Why it is necessary to have compulsory certification of seed varieties; b) Why the NPT process in Kenya takes too long compared to other countries; c) The scope of reducing certification costs incurred by producers; and, d) Strategies for avoidance of legal loopholes and duplication of efforts among the regulatory institutions especially in the context of AFFA and the Crops Act.

f) While monopolistic tendencies have been adequately demonstrated in this survey, the way forward regarding government support to PSCs should consider whether or not there are economies of scale in production and distribution of seeds (a dimension that was beyond the scope this market inquiry). If there are no economies of scale then there would be no advantage in government's support of monopoly except for strategic reasons anchored on national food security and the critical role that access to affordable seeds plays. On the basis of this market inquiry alone, therefore, no unequivocal support can be accorded to the views of the industry players that government should divest from the PSCs in order to increase competition in the seed industry. This recommendation is buttressed by the fact that the majority of the seed producers stated that there were no particularly serious impediments to entry into and/or exit from the seed market apart from the usual business issues to do with energy and financing costs and poor infrastructure. However lessons learnt from other sectors suggest that the government could reduce its shareholding in Kenya Seed Company from the current 59% to below 50% (minority equity) and still be able to maintain a robust seed sector.

g) The seed distribution model in Kenya should be made more efficient by promoting functional specialization. The following issues should be addressed by the seed producers and STAK: a) minimizing conflicts between seed producers and their distributors by ensuring that the former do not also double as sales agents and by promoting legally binding contractual agreements; b) promoting price discount arrangements with agro-

dealers that encourage them not just to increase their sales volumes but also to provide farmers with integrated service packages; c) increased use of ICT based strategies e.g. for tracking/management seed stocks in collaboration with KEPHIS in order to minimize losses arising from expired seeds; and, d) elimination, through advocacy, of some of the entry barriers such as poor infrastructure, high energy costs and insecurity in some of the regions of the country.

h) Discussions with seed producers suggest that NCPB currently does not impact directly in any way on their operations despite the Board having agency arrangements with some seed companies. Although the agency arrangements allow the seed companies to use the Board's vast facilities distributed throughout the country, the offer is open to all players and no issues seem to have been raised so far regarding potential harm by such arrangements to competition in the seed market. That notwithstanding, it is recommended that stakeholders in the seed industry discuss with government the mandate of NCPB in the context of AFFA and the Crops Act 2013 with a view of reducing indirect market distortions, and avoiding conflicts and duplication of functions considering the Board's role as a buyer of last resort and custodian of the strategic reserve for national food security.

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7.0 Annexes

Annex 7.1: Regional Production of Various Crops in Kenya

Crop	Indicator	Central	Coast	Eastern	Rift Valley	Nyanza	Western	Nairobi	North Eastern	Country Total
Maize	Area (Ha)	175,698	136,953	454,720	675,097	327,210	233,494	723	4,451	2,008,346
	Production (90kg bags)	1,402,237	1,963,807	3,766,753	21,139,706	5,056,561	5,142,904	13,740	9,190	38,494,899
	Yield (bag/Ha)	8	14	8	31	15	22	19	2	19.2
Wheat	Area (Ha)	8,182	-	23,967	127,825	-	69	-	-	160,043
	Production (90kg bags)	322,226	-	772,166	4,592,690	-	1,735	-	-	5,688,817
	Yield (bag/Ha)	39	-	32	36	-	25	-	-	36
Barley	Area (Ha)	142	-	3,350	21,631	-	-	-	-	25,123
	Production (90kg bags)	3,635	-	82,200	627,705	-	-	-	-	713,540
	Yield (bag/Ha)	26	-	25	29	-	-	-	-	28
Rice	Area (Ha)	10,301	3,090	-	9	5,428	1,329	-	24	20,181
	Production (90kg bags)	544,401	32,783	-	206	296,360	15,127	-	480	889,357
	Yield (bag/Ha)	53	11	-	23	55	11	-	20	44
Sorghum	Area (Ha)	999	3,088	119,751	13,677	61,560	24,059	13	2,635	225,782
	Production (90kg bags)	4,020	17,872	726,140	146,177	674,083	251,407	66	3,185	1,822,950
	Yield (bag/Ha)	4	6	6	11	11	10	5	1	8
Millet	Area (Ha)	90	224	67,657	9,980	15,681	5,483	-	10	99,124
	Production (90kg bags)	283	1,359	381,094	83,391	84,909	47,642	-	0	598,678
	Yield (bag/Ha)	3	6	6	8	5	9	-	-	6
Beans	Area (Ha)	105,896	2,721	126,197	281,322	154,461	118,114	621	44	689,377
	Production (90kg bags)	504,847	15,185	982,499	768,732	630,136	435,424	3,158	0	4,339,980
	Yield (bag/Ha)	5	6	8	6	4	4	5	0	6
Green Gram	Area (Ha)	316	11,961	131,768	793	2,038	-	5	471	147,352
	Production (90kg bags)	1,320	44,924	621,058	4,746	7,884	-	8	588	680,528
	Yield (bag/Ha)	4	4	5	6	4	-	2	1	5
Pegion Pea	Area (Ha)	848	732	156,030	1,125	-	-	11	0	158,746
	Production (90kg bags)	3,599	2,882	1,133,484	7,047	-	-	29	0	1,147,040

	Yield (bag/Ha)	4	4	7	6	-	-	3	-	7
Cow peas	Area (Ha)	638	16,112	143,954	1,103	5,622	-	37	807	168,273
	Production (90kg bags)	4,802	67,591	707,632	6,690	15,192	-	36	1,104	803,046
	Yield (bag/Ha)	8	4	5	6	3	-	1	1	5
Cassava	Area (Ha)	629	22,313	7,891	990	5,822	23,899	19	10	61,573
	Production (Tons)	5,102	83,528	78,754	20,844	44,296	90,759	37	70	323,389
	Yield (Ton/Ha)	8	4	10	21	8	6	2	7	8
Sweet Potatoes	Area (Ha)	3,308	1,084	6,513	5,462	10,653	15,245	37	10	42,312
	Production (Tons)	43,097	8,620	41,065	61,704	119,769	109,202	73	60	383,590
	Yield (Ton/Ha)	13	8	6	11	11	7	2	6	9
Cocoyam	Area (Ha)	1,156	62	789	120	-	613	34	-	2,774
	Production (Tons)	8,837	300	5,179	1,896	-	2,784	59	-	19,054
	Yield (Ton/Ha)	8	5	7	16	-	5	2	7	
Yams	Area (Ha)	145	-	1,078	1	-	-	-	-	1,224
	Production (Tons)	978	-	7,054	3	-	-	-	-	8,035
	Yield (Ton/Ha)	7	-	7	3	-	-	-	-	7
Irish potatos	Area (Ha)	53,822	31	17,314	53,579	1,500	4,720	81	-	131,047
	Production (Tons)	1,086,557	289	331,848	1,607,370	25,000	95,347	1,852	-	3,148,213
	Yield (Ton/Ha)	20	8	19	30	17	20	23	-	24
Ground nuts	Area (Ha)	-	24	582	830	13,670	4,185	-	-	19,291
	Production (Tons)	-	16	7,301	15,061	61,718	14,976	-	-	99,072
	Yield (Ton/Ha)	-	1	13	18	5	4	-	-	5
Grain Amarath	Area (Ha)	25	-	-	46	-	-	-	-	71
	Production (bags)	190	-	-	483	-	-	-	-	672
	Yield (bag/Ha)	7	-	-	11	-	-	-	-	9

Source: RoK, Economic Review of Agriculture (2011)

Annex 7.2 Three year moving average for varietal release (2000-2013)

	Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	
Annual Counts	Maize	8	13	9	21	20	3	11	6	39	2	24	8	15	15	
	Sorghum	2	0	0	0	0	0	1	0	4	0	0	1	0	2	
	Beans	0	0	0	0	0	0	0	0	12	0	0	0	0	1	
	Cowpeas	3	0	0	0	0	0	0	0	0	0	0	0	0	0	
Three-year Moving average	Maize				10	14.3	16.7	14.7	11.3	6.7	18.7	15.7	21.7	11.3	15.6	12.7
	Sorghum				0.7	0	0	0	0.3	0.3	1.7	1.3	1.3	0.3	0.3	1.0
	Beans				0	0	0	0	0	0	4	4	4	0	0	0.3
	Cowpeas				1	0	0	0	0	0	0	0	0	0	0	0.0

Annex 7.3: Seed companies involved in the production of various seeds in 2013

	Maize	Sorghum	Beans	Cowpeas
Agricultural Development Corporation (ADC)	√			
AgriSeedco (Seedco)	√	√		
Crop Africa Ltd	√			
Dryland seeds	√	√	√	√
East African Seed Co Ltd	√		√	√
Egerton University			√	
Elgon Kenya Ltd	√			
Farm Chem Ltd	√ 2011*		√ 2009	
Freshco International Ltd	√	√	√	√
KARI Seed Unit	√	√	√	√
Kenya Seed Company	√	√	√	√ 2012
Lambwe Seed Growers Agencies			√ 2009	
Leldet Ltd	√	√	√	√
Monsanto Ltd	√			
Oil Crop Dev Ltd	√			
Olerai Ltd	√ 2012			
Pannar Seed	√			
Pioneer Hi-Bred (K) Ltd	√			
Simlaw Seeds Co Ltd	√	√	√	√
Veterinary & Agronomic E.	√ 2010			
Western Seed	√	√	√ 2012	√2009
Total number of seed companies involved in production in 2013	*16*	*8*	*8*	*6*

*- Year denotes the last time the company produced a particular seed
Source: KEPHIS (2014)

Annex 7.4: List of respondents from different organizations

Institution/Company		Key Interests	Person Interviewed	Contacts
Seed Companies				
1.	Pannar Seeds (Kenya) Ltd,	Maize Seed	Francis Ndung'u, Sales and Marketing manager,	Tel:+2540202405805
2.	AgriSeedCO Ltd	Maize and Sorghum	Kassim Owino, General Manager,	P.O Box 616, 00621,
3.	Simlaw Seeds Co. Ltd	Beans, Cowpeas	Robert W. Musyoki, Research Officer	P.O Box 40042 00100 Nairobi
4.	Olerai Ltd	Maize	Hugo Wood, Proprietor/Manager (current Chair of the Cereal Growers Association)	Narok, 0722-570311
5.	University of Nairobi (Uniseeds Ltd)	Beans	Prof. Paul Kimani, Bean Breeder	University of Nairobi
6.	Western Seed Company ltd	Maize, Sorghum, Beans	Saleem Eshmail, General Manager	Kitale, 0722-514236 saleeme@gmail.com
7.	Kenya Agricultural Research Institute	Maize, sorghum, Beans, Cowpeas	Dr. James Ochieng Seed Systems Department	KARI Hq, Nairobi
7.	GNASS Kenya Ltd	Maize, Sorghum, vegetables	Mr. Thomas Opiyo, Sales Director	Baba Dogo-Nairobi 0723 597677
8.	East African Seed Co. Ltd	Maize, Sorghum, Cowpeas	Jesse Onsando, Business Development Manager	Industrial Area, Nairobi
9.	Elgon Kenya Ltd	Maize and Beans	Manish Tyagi, Business Manager (Seeds)	Mombasa Road, Nairobi. 0733-191512
10.	Monsanto	Maize	Johnston Thaiyia, Product Development	0722205294

11.	Kenya Seed Co. Ltd	Maize, Sorghum, Beans, Cowpeas	Beatrice Ayabei, Distribution manager	Kitale
12.	Dryland Seed Limited	Maize, Sorghum, Beans, Cowpeas	Milcah Munyiva Mutisya, Performance & Evaluation Officer	Box 1438-90100 ASK Grounds, Machakos, Kenya Tel:+254 -4421449
13.	Pioneer Hybrid Kenya	Maize	Micheal Barasa, Marketing Officer	Nairobi/Eldoret
14.	FreshCo	Maize	Captain Karanja, General Manager	Muthaiga, Nairobi 0722-516953
15.	Migotiyo Plantations Ltd	Maize	Ms Corien Herweijer, Marketing Executive	Nairobi, 0722-529884
16.	Wakala Africa	Maize	George Otieno, Manager	Utawala, Nairobi 0722-653577
17.	ADVANTA	Maize	Jagadeshwar Reddy (Technology Development Manager) and Shabir Ahmed Khan (Business Manager East Africa)	jagadeshwar.reddy@advantaseeds.com shabbier.khan@advantaseeds.com
Seed Associations				
18.	Plant Breeders Association of Kenya	Support Plant breeders	Raphael Ngige, Secretary General, Plant Breeders Association of Kenya.	0720447723
19.	The African Seed Trade Association (AFSTA)	Enhancing Seed Trade	Grace Gitu Technical Officer,	Tel: +254 202727853/860
20.	The Seed Trade Association of Kenya (STAK)	Represents interests of seed traders	Evans O. Sikinyi, PhD, Executive Officer	Tel: +254-202587162
21.	Cereal Growers	Promotes interests of cereal growers	Anthony M. Kioko, Chief Executive Officer	P.O Box 27542-00506, Nyayo Stadium, Nairobi-Kenya

	Association			
	Government Department/Regulators			
22.	KEPHIS	Seed Regulator	Simon M. Maina Ag. Head, Seed Certification& Plant Variety Protection	P.O Box 49592-00100, Nairobi, Kenya. Tel: +254-0203536171/2
23.	Pest Control Products Board	Regulation of Pesticide and handling	Peter M. Kimwele Regional Manager/Ass. Director of Agriculture	Tel+ 254 0208068933
24.	State Department of Agriculture	Agricultural (Seed) Policy implementation	Beatrice King'ori, Directorate of Crop Management	Kilimo House, Nairobi
25.	National Cereals and Produce Board (NCPB)	Strategic Grain reserve, commercial grain trade	James Boit Research and Development Manager,	Nairobi