TASAI

THE AFRICAN SEED ACCESS INDEX

Nigeria Brief 2018 - The African Seed Access Index

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October 2019

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INTRODUCTION

A competitive seed sector is key to ensuring the timely availability of high-quality seed of improved, appropriate varieties at affordable prices for smallholder farmers. TASAI seeks to encourage public policymakers and development agencies to create and maintain enabling environments that will accelerate the development of competitive formal seed systems serving smallholder farmers.

This country brief summarizes the key findings of The African Seed Access Index (TASAI) study conducted in 2018 to appraise the structure and economic performance of Nigeria's seed sector. The study evaluates the enabling environment necessary to build a vibrant formal seed sector, focusing on four grain and legume crops important to food security in Nigeria – maize, rice, soya bean and sorghum – the cultivation of which covers about 48% of the country's arable land (Food and Agriculture Organization of the UN, 2019). The study covers 20 indicators divided into the following categories: Research and Development, Industry Competitiveness, Seed Policy and Regulations, Institutional Support, and Service to Smallholder Farmers. Appendix 1 summarizes all 20 indicators and compares Nigeria with 18 other African countries where TASAI has conducted similar studies between 2016 and 2018.

Overview

Like in most other African countries, the seed industry in Nigeria consists of two systems: the informal sector and the formal sector. This policy brief focuses almost exclusively on the formal seed sector.

The informal sector broadly refers to the system in which farmers produce, obtain, maintain, and distribute seed resources from one growing season to the next (FAO, 1998). Due to limited exposure, low availability of most varieties, inability to purchase seed, limited access to agro-dealers, or for other reasons, a significant number of smallholder farmers in Nigeria still rely on the informal seed sector. Standards in the informal seed sector are not monitored or controlled by government policies and regulations; rather, they are guided by indigenous knowledge and standards, and by local social structures. The locally-grounded nature of these transactions means that there is scant performance data available on the informal sector.

The formal sector focuses on breeding and evaluating improved varieties, as well as producing and selling certified seed. Seed is certified by the National Agricultural Seed Council (NASC), the government entity responsible for regulating seed in Nigeria. Nigeria's formal seed sector comprises a number of institutions (Table 1), including national agricultural research institutions (e.g., the IAR&T, the NCRI and the NRCRI), international agricultural research institutions (e.g., the IITA and Africa Rice), state agricultural departments, universities (e.g. Ahmadu Bello University, the Federal University of Agriculture, and Obafemi Awolowo University), private sector institutions (foreign and local seed companies and enterprises), and development agencies (NGOs and CBOs). Formally registered in 2008, the Seed Entrepreneurs Association of Nigeria (SEEDAN) brings together seed companies and other key private sector players in the industry.

Table 1: Role of key players in Nigeria's formal seed sector

ROLE	KEY PLAYERS
Research and breeding	IAR&T, IAR, NCRI, NCRCI, universities, seed companies, CGIAR
Variety release and regulation	NASC, NACGRAB
Seed production and processing	Seed companies, seed producers, IAR&T, IAR, NCRI
Education, training, and extension	Seed companies, State departments of agriculture, NGOs, rural agro-dealers, SEEDAN
Distribution and sales	Seed companies, rural agro-dealers, NGOs

Key acronyms: ADP – Agricultural Development Program; **AFSTA** – African Seed Trade Association; **ATA** – Agricultural Transformation Agenda; **CGIAR** – Consultative Group on International Agricultural Development; **ECOWAS** – Economic Community of West African States; **EGS** – Early Generation Seed; **FARO** – Federal Agriculture Research Oryza; **FMARD** – Federal Ministry of Agricultural and Rural Development; **IAR** – Institute of Agricultural Research; **IAR&T** – Institute for Agricultural Research and Training; **ICRISAT** – International Center for Research in the Semi-Arid Tropics; **IITA** – International Institute of Tropical Agriculture; **ISTA** – International Seed Testing Association; **NASC** – National Agricultural Seed Council; **NACGRAB** – National Centre for Genetic Resources and Biotechnology; **NCRI** – National Cereals Research Institute; **SEEDAN** – Seed Entrepreneurs Association of Nigeria.

RESEARCH AND DEVELOPMENT

Number of active breeders

There are 23 active breeders for the four priority crops – maize, rice, soya bean and sorghum. Nineteen of these breeders are based at various public agricultural research institutes - the Institute of Agricultural Research and Training (IAR&T) and the Institute for Agricultural Research (IAR) for maize and sorghum, and, in the case of soya bean and rice, the National Cereals Research Institute (NCRI). Universities including Ahmadu Bello University, the Federal University of Agriculture, and Obafemi Awolowo University also have active plant breeding programs (Table 2). Of the 19 public breeders, 9 work with maize, 3 work with rice, 3 work with soya bean, and 4 work with sorghum. Four breeders are employed by private companies – two maize breeders, one of which also works on sorghum, and one breeder each for rice and soya bean. The public breeders work very closely with the international institutions, especially the International Institute of Tropical Agriculture (IITA) and Africa Rice.

All the local private seed companies, including those that employ their own breeders, also rely on public breeders due to the high cost of maintaining an in-house breeding program.

Table 2: Industry satisfaction with the number of active breeders in Nigeria

Crop	Number of breeders	Industry satisfaction (out of 100%)[1]	Interpretation of satisfaction
Maize	11	58%	Fair
Rice	5	58%	Fair
Soya bean	4	38%	Poor
Sorghum	5	42%	Fair
Total	**24[2]**	**52%**	**Fair**

On average, seed companies rate their satisfaction with the number of active breeders as "fair" for maize (58%), rice (58%) and sorghum (42%) and "poor" for soya bean (38%). These ratings are quite low and signal a need to strengthen breeding capacities in public institutions.

Varieties released in the last three years

Figure 1 shows the 3-year moving average of variety releases since 2000. According to the National Centre for Genetic Resources and Biotechnology (NACGRAB), far more new varieties were released and registered for maize than for any other crop: between 2015 and 2017, 25 new varieties of maize were released, compared to 5 new varieties of rice and 2 new varieties of sorghum. No new soya bean varieties were released between 2015 and 2017. Most of the new varieties were developed by international institutions: 16 maize varieties, 5 rice varieties and 2 sorghum varieties were developed by the IITA, Africa Rice and ICRISAT, respectively.

Varieties were released in similar proportions over the broader period from 2000-2017: during these years, 84 varieties of maize were released (26 varieties were released in 2009), compared to 21 rice, 13 sorghum, and 7 soya bean varieties (Figure 1).

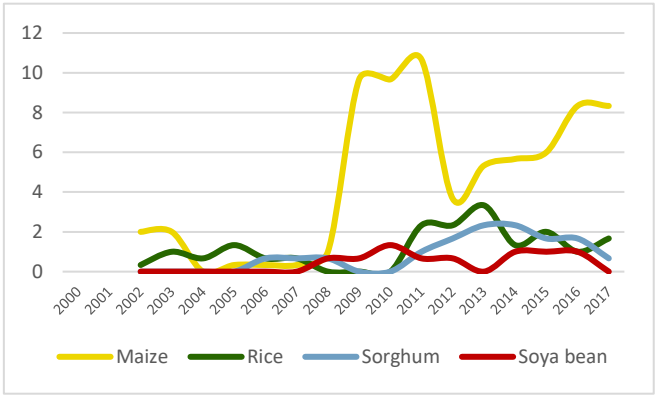

Figure 1: Number of varieties released in Nigeria (three-year moving average)

In the last two decades, sorghum has gained popularity as a commercial crop. As a result, most sorghum variety releases occurred after 2000. The same applies for rice. The increase in the number of varieties released for rice is likely driven by the government's promotion of rice cultivation as an import substitution strategy.

Availability of foundation seed

On average, seed companies rate their satisfaction with the availability of foundation seed for all four crops as "good": maize (74%), rice (72%), sorghum (70%) and soya bean (71%). It is important to note that the two multinational seed companies, which maintain their own foundation seed for maize and rice, recorded a much higher

[1] All scores are based on industry self-reporting of satisfaction on the following scale (and are color-coded as follows): 0-19.99% (extremely poor), 20-39.99% (poor), 40-59.99% (fair), 60-79.99% (good), and 80-100% (excellent).

[2] One of the private breeders works on two crops

(95%) average rating. However, because they represent a small portion of the overall sample (2 out of 48), their ratings did not influence the overall average strongly.

Table 3: Availability of foundation seed

Crop	Availability of foundation seed		
	Average industry satisfaction (out of 100%) n=48	Interpretation of satisfaction	% of seed companies giving a rating of 50% or less
Maize	74%	Good	19%
Rice	72%	Good	22%
Sorghum	70%	Good	28%
Soya bean	71%	Good	16%

The "good" rating mainly applies to the Nigerian-owned seed companies, all of which rely on the national and international agricultural research institutions for basic seed. Some seed companies have a good relationship with the research institutions and receive foundation seed when they need it.

Despite the overall "good" rating, some seed companies face difficulties accessing foundation seed, as evidenced by standard deviations of around 20% across the four crops, indicating that some seed companies are highly satisfied with the availability of foundation seed while others are not. Further evidence of this difficulty is the number of companies that reported low levels of satisfaction. Among seed companies that produce maize, rice or sorghum seed, nearly one-fifth (19%) rated their satisfaction as 50% or less. These companies complain that the basic seed of their preferred variety is not always available – or at least not in sufficient quantities. As a solution, they recommend that breeders and companies collaborate to forecast demand more accurately.

The main sources of foundation seed are the IAR and the IAR&T for maize, the NCRI, Africa Rice and the IITA for rice, ICRISAT and the IAR for sorghum, and the IITA and the NCRI for soya bean. Two Nigerian-owned private seed companies have been authorized to produce and commercialize basic seed.

These findings are consistent with the *Feed the Future* study (USAID, 2016), which revealed a notable shortage in the supply of the different types of early-generation seed, especially breeder seed and basic seed, in Nigeria. With respect to maize and rice, the study noted that one common supply-side constraint was the lack of adequate demand forecasts, which led to the production of basic seed below the quantities required by seed companies.

Average age of varieties sold

The average age of the varieties currently on the market is as follows: 7 years for maize, 14 years for rice, 12 years for soya bean, and 31 years for sorghum (Table 4). Many of the popular varieties being sold by seed companies are under 10 years old, including the SAMMAZ maize series (14, 15, 16 and 17), the FARO 61 and FARO 59 rice varieties and the TGX 1835-10E and TGX 1951-3F soya bean varieties. However, some popular varieties are at least 25 years old, including the FARO 44 rice variety (27 years), the TGX 1448-2E soya bean variety (25 years) and two sorghum varieties – ICSV-400 (35 years) and SK 9512 (47 years).

Table 4: Name and age of popular varieties sold by seed companies

Crop	Name of popular varieties	No. of seed companies selling the variety	Age of variety in 2017
Maize	SAMMAZ 15	27	9
	SAMMAZ 16	13	9
	SAMMAZ 17	11	8
	SAMMAZ 14	10	2
	Average age		**7**
Rice	FARO 44	40	27
	FARO 52	15	16
	FARO 61	8	6
	FARO 59	6	6
	Average age		**14**
Soya bean	TGX 1448-2E	18	25
	TGX 1835-10E	2	9
	TGX 1951-3F	2	3
	Average age		**12**
Sorghum	CSR-01	11	11
	ICSV-400	4	35
	SK 5912	4	47
	Average age		**31**

Number of varieties sold

In 2017, the numbers of varieties sold to farmers were as follows: 31 maize varieties, 10 rice varieties, 7 sorghum varieties and 11 soya bean varieties (Table 5).

Comparing the number of varieties sold in 2017 with the number released between 2000 and 2017 indicates the difficulties involved in the commercialization of varieties. Of the maize, rice and sorghum varieties released over this 18-year period, less than half – 33%, 38% and 46% respectively – were sold in 2017. For soya bean seed, the percentage is slightly higher: 57%.

Table 5: Number of varieties released and sold

Crop	Number of varieties released (2000-2017)	2017	
		Number of varieties sold (/% of number released)[3]	Number of varieties sold, overall
Maize	84	28 (33%)	31
Rice	21	8 (38%)	10
Soya bean	7	4 (57%)	11
Sorghum	13	6 (46%)	7

The low rate of commercialization of the recently released maize and rice varieties is likely due to the low level of farmer awareness and the high cost of marketing and distributing new varieties.

Despite the low commercialization rate of recently released maize varieties, Nigeria has the highest number of varieties sold in West Africa (31). However, when compared to most of East and Southern Africa, the number of maize varieties sold in Nigeria is relatively low (Figure 2).

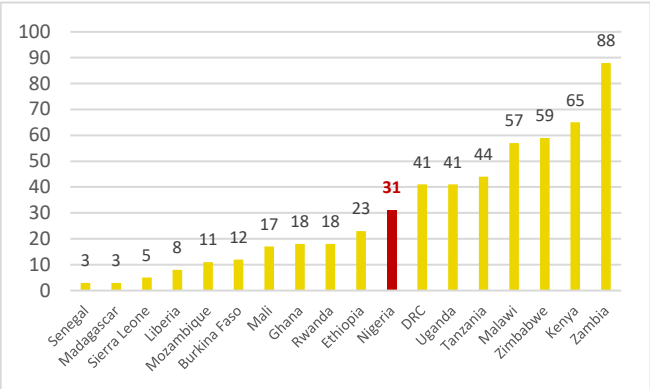

Figure 3: Number of maize varieties sold to farmers

The number of rice varieties sold in Nigeria (9) is lower than the number sold in most West African countries, where rice is also an important staple, including Ghana, Mali, Liberia, Sierra Leone and Senegal (Figure 3).

Number of varieties dropped between 2008 and 2017

Between 2008 and 2017, 8 varieties of maize were

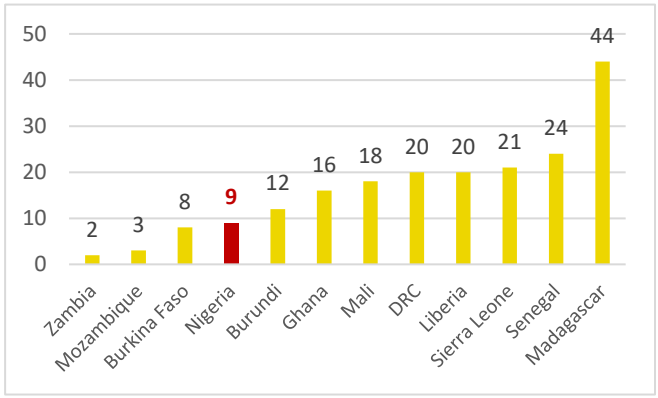

Figure 2: Number of rice varieties sold to farmers

dropped[4] (i.e., no longer sold) by at least one seed company. The reasons for dropping varieties included poor yield, availability of alternative superior varieties, and lack of available basic seed. Seven rice varieties were dropped due to the availability of superior varieties, high pest incidence and low demand. Two sorghum varieties were dropped due to lack of market demand and two soya bean varieties were dropped due to low productivity (Table 6).

Table 6: Varieties dropped by seed companies (2008-2017)

Crop	Number of varieties dropped	Examples of varieties dropped	Reasons for dropping varieties
Maize	8	ACR97, COMFORT 5, DMR-ESR-Y, KSV-8, SAMMAZ20, SAMMAZ39, SUWAN-I-Y, TZESR-W	• Poor yield • Availability of superior varieties • Lack of basic seed
Rice	7	FARO 44, FARO 52, FARO 57, ITA 50, NERICA 1, NERICA 7, KSV 8	• Availability of superior varieties • High pest incidence • Low demand
Sorghum	2	ICSV 111, ICSV 400	• Lack of market demand
Soya bean	2	TGX 1448, SAMSOY 2	• Poor yield

Varieties with climate-smart features

To be classified as climate-smart, a crop variety must meet at least one of two criteria – early maturity and/or tolerance to extreme weather conditions, such as

[3] Some of the varieties sold in 2017 were released before 2000, therefore, the number in this column may exceed the number in the previous column.

4 A variety may be dropped by one seed company but still sold by another.

drought, flooding or frost. Of the 25 maize varieties released between 2015 and 2017, 11 varieties had drought-tolerant characteristics, while 5 varieties were early maturing. The higher number of drought-tolerant varieties is due to the increased cultivation of maize in the drier regions of the country, such as the Northern Guinea Savannah and the Sahel.

Both sorghum varieties released during this period were early maturing. Drought-tolerance is not a common feature for sorghum, as sorghum is adapted to dry areas. None of the rice varieties released during this period had any climate-smart features, and there were no soya bean releases during this period.

INDUSTRY COMPETITIVENESS

Number of active seed companies

All seed companies must be registered by the NASC in accordance with the council's standard operating procedures. According to the NASC, there were a total of 156 seed companies in Nigeria in 2017. Of these, 106 notified the NASC of their intention to produce and market seed of one or more of the four focus crops.[5] However, of these, the NASC estimates that only about 60 seed companies have the appropriate capacity in terms of adequate human resource skills and infrastructure for seed processing and storage. The remaining registered companies are mainly seed producers who neither process nor package their seed.

Of the 106 seed companies, most seed companies intended to produce maize seed (71) and rice seed (87). A smaller number of seed companies intended to produce sorghum seed (27) and soya bean seed (26). The high number of rice seed companies is partly due to the government initiative to support rice production in the country, which aims to reduce imports. Similar government programs in the past, such as the Growth Enhancement Scheme (GES), have incentivized the private sector to set up seed companies, with the primary purpose of benefiting from such programs.

Of the 106 active seed companies, 48 (45%) were interviewed for the TASAI study (Table 7). Participating companies all produced seed in 2017, their fields had been certified by NASC, and they agreed to share information about their businesses. While fewer than half of the active companies were interviewed, the end result is still a representative sample, as most seed companies in Nigeria have a small production capacity: for instance, about half of the active maize seed companies produce 10% of maize seed, and half of the rice seed companies produce only 16% of all rice seed.

Table 7: Number of active seed companies in Nigeria in 2017

Crop	No. of registered seed companies	No. of companies reached in TASAI study	% of companies interviewed
	106	**48**	**47%**
Maize	71	37	52%
Rice	87	41	47%
Sorghum	27	19	70%
Soya bean	26	21	81%

Production and sale of certified seed

In 2017, the aggregate volume of seed produced according to our survey was 26,613 tons of maize seed, 52,323 tons of rice seed, 2,818 tons of sorghum seed and 2,544 tons of soya bean seed. The estimated volume of seed sold was 16,639 tons of maize seed, 38,627 tons of rice seed, 1,596 tons of sorghum seed and 1,860 tons of soya bean seed (Table 8).

Table 8: Seed production and sale in 2017

Crop	Seed data in 2017 (in tons)		
	Seed production (NASC data)	Seed production (TASAI data)	Seed sales (TASAI data)
Maize	32,207	26,613	16,639
Rice	37,695	52,323	38,627
Sorghum	1,204	2,818	1,596
Soya bean	976	2,544	1,860

There are notable differences in the seed production data collected by the NASC and TASAI, especially for maize seed, rice seed, and soya bean seed. The figures collected by TASAI on rice, maize, and soya bean are significantly higher than the NASC data.

The data on seed sales does not match the data on seed production, because the two often occur in different years. That is, seed produced one year may be sold the next year. In Nigeria, most seed companies are located in the northern part of the country. In this region, seed production takes place between June and September.

[5] Since 2017, the number of seed companies has increased to 314. In addition, some 500 seed cooperatives are in the process of being formally recognized as seed entrepreneurs by the NASC. However, the TASAI study focused on 2017, which was the most recent complete year when the study started in 2018.

However, agricultural production in the southern region takes place earlier in the year. Nevertheless, seed production data are expected to be similar to seed sales data.

Seed companies' processing capacity

Seed processing[6] capacity is determined by the operational capacity of the seed processing machines owned by the companies.

The aggregate seed processing capacity for the four crops is as follows: 53,396 tons for maize seed, 81,360 tons for rice seed, 13,622 tons for sorghum seed, and 12,341 tons for soya bean seed (Table 9). Apart from rice, on average, seed companies are not operating beyond 50% of their processing capacity: maize (50%), sorghum (21%) and soya bean (21%). The higher percentage for rice (64%) may be due to the Nigerian government's increased focus on rice production as an import substitution strategy.

Table 9: Quantities of seed produced and processing capacity

Crop	Seed production in 2017 (in tons)	Seed processing capacity (in tons)	% of production capacity used
Maize	26,613	53,395	50%
Rice	52,323	81,360	64%
Sorghum	2,818	13,622	21%
Soya bean	2,544	12,341	21%

Market share of top seed companies

The market share of the top four seed companies is calculated based on seed sales as reported by seed companies. By crop, the market shares of the top four companies are: 63% for maize, 37% for rice, 65% for sorghum, and 59% for soya bean (Figure 4). These figures show that the seed market for all four crops is competitive.

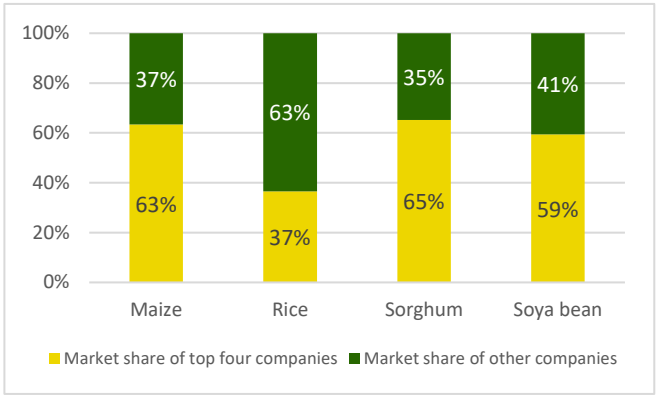

Figure 5: Market share of the top four companies

The Herfindahl-Hirschman Index (HHI) was also used to quantify industry competitiveness. The index, a sum of squared market shares, ranges from near zero for perfect competition to 10,000 for a pure monopoly[7]. The HHI was calculated for all seed companies for each crop. Market concentration for maize (1,441), sorghum (1,337) and soya bean (1,239) is low, while the market concentration for rice (552) is extremely low. The market shares of the top four companies and the HHI results both indicate high levels of competition in the seed market for all four crops.

When looking at maize alone, the market share of the top four maize seed companies in Nigeria (63%) is notably lower than in most other African countries where TASAI has conducted studies. In 9 of the 21 countries surveyed by TASAI, the market share of the top four companies is at least 80% (Figure 5).

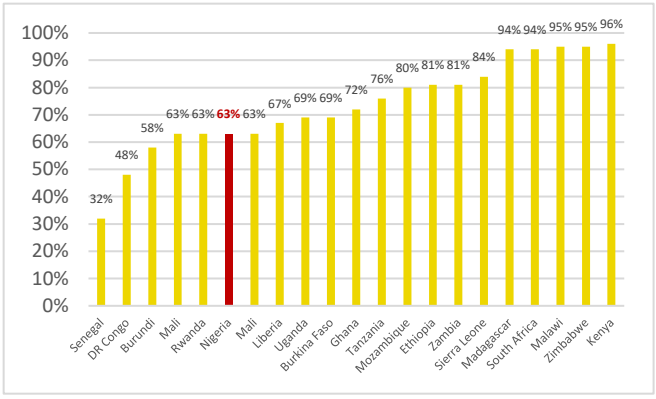

Figure 4: Market share of top four maize companies in Africa

Market share of government parastatal

In 2017, there was no government parastatal involved in the production and marketing of certified seed in Nigeria.

Seed sales to different categories of buyers

Seed companies sell seed to different categories of buyers – farmers (directly), agro-dealers and government institutions/ NGOs. Government institutions and NGOs are the largest buyers of maize and rice seed, purchasing 47% and 48% of the total amount of seed sold by companies (Table 10). In addition to the federal and state ministries of agriculture, the other institutions and programs that procure seed include Fadama, the Nigeria Incentive-Based Risk-

[6] Seed processing is the preparation of harvested seed for marketing to farmers. It involves drying, threshing, precleaning, cleaning, size grading, treating, quality testing, packaging and labelling (FAO 2018).

[7] The scale for HHI scores ranges from extremely low to extremely high levels of market concentration: <1,000 (extremely low), 1,000-1,999 (low), 2,000-2,999 (average), 3,000-3,999 (high), >4,000 (extremely high, i.e., monopoly or near monopoly).

Sharing System for Agricultural Lending (NIRSAL), and the Central Bank of Nigeria (CBN). The CBN's seed purchases are made as part of the government's anchor borrowers' scheme, an initiative launched by the Nigerian President aimed at linking farmers to agro-processors.

Only half of the maize seed (50%) and rice seed (49%) is sold to farmers, either directly or through agro-dealers. In contrast, most sorghum seed (87%) and soya bean seed (52%) is sold directly to farmers.

To ensure that seed sales to government agencies follow the correct procedures, the NASC intends to meet with the procurement officers from these agencies. The purpose of this meeting is to train them in the correct procedures for purchasing certified seed. This includes explaining, for example, that only registered seed companies can sell seed and that all seed must be certified by the NASC. In addition, the NASC will require that all procurement transactions must be cleared by the council.

Table 10: Percentage of seed sales to different categories of buyers

Crop	Percentage of seed sales to different categories of buyers				
	Directly to farmers	To agro-dealers	To govt and NGOs	To others	TOTAL
Maize	23%	27%	47%	3%	100%
Rice	28%	21%	48%	3%	100%
Sorghum	87%	5%	7%	0%	100%
Soya bean	52%	31%	17%	1%	100%

Length of import process for seed

The length of the seed import process is calculated as the number of days from the application for an import permit to the time the seed is cleared at the border. The import process is expected to follow national laws and the ECOWAS Seed Regulations. Accordingly, only seed that is listed in the ECOWAS Catalogue of Plant Species is permitted to be imported for commercial purposes. However, seed that is not listed in the ECOWAS catalogue can be imported in small quantities for experimentation purposes.

SEEDAN has received several requests to supply certified seed to buyers in the ECOWAS region and has exported seed to the Gambia, Ghana and Sierra Leone. Under the 2019 NASC Act, these export transactions will need to be approved by the NASC.

SEED POLICY AND REGULATIONS

Length of variety release process

The length of the variety release process is calculated as the period of time from the submission of an application for a new variety to be officially assessed, to its release by the relevant authority for use by farmers. In Nigeria, variety release falls under the mandate of the National Centre for Genetic Resources and Biotechnology (NACGRAB). NACGRAB has published detailed guidelines explaining the process for release and registration of new crop varieties in Nigeria (NACGRAB, 2016).

A breeder's application is submitted to the National Crop Variety and Livestock Breeds Registration and Release Committee after the two main tests – Distinctness, Uniformity and Stability (DUS) and Value for Cultivation and Use (VCU) – have already been conducted. The application includes the results of these tests. The tests include three trials: first, one year of on-station trials. This is conducted in collaboration with the relevant National Agricultural Research Institution; second, two years of multi-location trials, that is, trials at 10 different sites in different agro-ecological zones across the country; third, one year of on-farm trials on at least 10 different sites. The second and third tests may be conducted concurrently. The three tests may take up to three years. Thereafter, on average, breeders reported taking about 7 months from the submission of an application to the Committee until its approval of the variety for release. In total, the entire variety release process on average takes 43 months.

Breeders work with one of the appropriate national agricultural research institutions throughout the process of variety release. The institutions that have the mandate to conduct research on the four crops are the IAR and IAR&T for maize and sorghum, and the National Cereals Research Institute (NCRI) for rice and soya bean. NAGCRAB does not charge any fees for DUS and VCU testing. However, breeders are expected to incur the cost related to the two-year multi-location trials. For this, breeders reported incurring costs between US$ 2,000 and US$ 27,000 during the conduct of the various field trials. These costs mainly include accommodation costs, transport costs and allowances for those involved in the monitoring of these trials. The costs vary depending on the proximity of the breeder to the different sites, and on the number of varieties a breeder is testing at a given time. Despite

the high cost and long duration, breeders are satisfied with the variety release process, rating it as "good" (70%).

The length of the variety release process in Nigeria (43 months on average) is notably higher than the length of the process in other countries like Zimbabwe (18 months), South Africa (20 months) and Zambia (24 months) (Table 11). In these countries, the DUS and VCU tests are sometimes conducted concurrently. In addition, in the case of Zambia and Zimbabwe, exceptions are made for varieties that have been registered and released within the Common Market for Eastern and Southern Africa (COMESA).

Table 11: Duration of and satisfaction with variety release process

Country	Average time (months)	Satisfaction (out of 100)
Burundi	13	79
Zimbabwe	18	83
South Africa	20	83
Mali	24	60
Zambia	24	84
DRC	26	62
Uganda	28	75
Sierra Leone	30	83
Tanzania	31	70
Malawi	34	58
Kenya	36	52
Senegal	36	74
Nigeria	43	70
Ghana	42	43
Madagascar	43	54
Ethiopia	46	71

Status of seed policy framework

Nigeria has a national seed policy that was passed in 2015. The policy is intended to provide a framework to encourage private sector participation, fast-track variety development, registration and release and improve the quality of seeds available to farmers. In addition, seed is an important part of the Agricultural Promotion Policy (2016-2020). The first theme of this policy is productivity enhancements. One of the objectives under this theme is to increase productivity by ensuring access to high quality and price-competitive inputs (Development, 2016).

Prior to 2019, the main legal documents guiding the seed sector in Nigeria were the National Seeds Decree of 1992 and the National Agricultural Seeds Act, Cap N5 of 2004. The 2004 Act was repealed and replaced with the National Agricultural Seed Council Amendment Act of 2019. The Act was passed by the House of Representatives in December 2018, passed by the Senate in April 2019 and finally given Presidential assent in June 2019.

This Act establishes the NASC to promote and stimulate the development of a dependable seed industry; regulate and control seed registration and release; protect farmers from the sale of poor-quality seed; and to facilitate the production and marketing of high-quality seed. In addition, the Act promotes greater participation of the private sector in the seed industry (Nigeria, 2019).

Nigeria is a member of the Economic Community of West African States (ECOWAS). The new Act is in conformity with the ECOWAS Seed Regulation (C/Reg.4/05/2008), passed in 2008 (ECOWAS, 2008). For example, the Act elaborates on seed quality control and certification and seed production, institutes a national catalogue of plant varieties and species, creates a seed sector fund and establishes several seed committees.

Quality of seed regulations and enforcement

Seed companies report being satisfied with the quality of the seed law[8], rating the instrument as "excellent" (83%). The companies are equally satisfied with the enforcement of the Act, also rating this as "excellent" (84%). Despite the high satisfaction levels, seed companies are concerned about some aspects of the enforcement of the regulations. These include efforts to combat the sale of fake seed and ensuring that all players in the seed industry are registered and monitored.

Adequacy of seed inspectors

By the end of 2018, Nigeria had a total of 50 seed inspectors, all of whom were employed in the NASC Seed Inspectorate department (Figure 6). The country has no private seed inspectors. The NASC Act of 2019 vests the NASC with the responsibility of appointing seed inspectors. The functions of these inspectors are also defined in the law. The law allows the NASC to approve private bodies to conduct a range of seed services, including inspection and certification. On average, seed companies rate their satisfaction with seed inspection services as "excellent" (84%).

[8] The survey was conducted before the 2019 Act was passed

As part of the NASC's quality assurance system, the NASC has started the process of accrediting the central seed testing laboratory according to the International Seed Testing Association (ISTA) standards. Currently, most of the seed tests follow ISTA protocols. The NASC's overall goal is to be a center of excellence for seed quality assurance in West Africa.

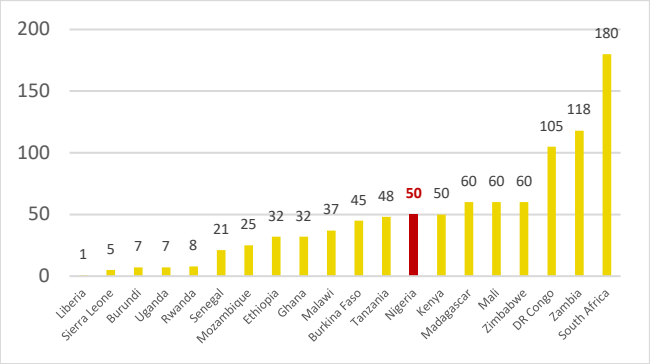

Figure 6: Number of seed inspectors

Efforts to stamp out fake seed

Seed companies reported receiving a total of 34 reports of the faking of improved seed in 2017. This figure is likely to be an underestimate, as most cases of fake seed sales are not reported. The NASC has implemented a range of activities aimed at combatting the problem of fake seed. Under the NSASC Act of 2019, the NASC has established a Seed Inspectorate Unit to lead this effort. Article 42(2) of the NASC Act outlines a list of offences, including: marketing seed without accreditation, marketing seed without a license, tampering with seed labels to mislead buyers about the quality of seed. First-time offenders face a penalty of US$ 2,700, while repeat offenders are charged twice that amount.

In addition, the NASC has embarked on a farmer awareness effort which involves reaching farmers through the radio and print media. Further, the NASC is developing two IT-based solutions. The first solution is a National Seed Tracker, which will enhance the traceability of seed from the farm to the point of sale. The second solution is an electronic authentication system called SEEDCODEX, which will allow farmers to receive feedback on the authenticity of the seed that they have purchased through SMS. Seed companies rate their satisfaction with the NASC's efforts to stamp out fake seed as "good" (70%).

According to seed companies, the two main sources of fake seed are traders and seed companies. Some traders and seed companies buy grain and package it as seed. The seed companies are motivated by government contracts to supply seed. Unfortunately, the seed procured by government agencies is not always checked to ascertain whether it has been inspected and certified by the NASC.

Use of smart subsidies

The Federal Ministry of Agriculture and Rural Development (FMARD) did not implement a seed subsidy program in 2017. The last seed subsidy program was implemented between 2012 and 2015 under the Growth Enhancement Scheme (GES). Unfortunately, several seed companies are yet to be paid for seed they supplied under the program. According to the NASC, the government has paid out all the claims that have been authenticated. The pending payments are for claims that are yet to be authenticated. SEEDAN recognizes the efforts made by the government to make these payments.

However, SEEDAN is concerned that about US$ 1.5 million is still owed to seed companies, and this constitutes a major unresolved issue between the government and the private sector. Unfortunately, these delayed payments have led to significant financial losses for seed companies, especially those which obtained commercial loans to finance their operations during this period. Due to their failure to pay off these loans, some seed companies have been blacklisted by commercial banks.

INSTITUTIONAL SUPPORT

Availability of extension services

There are about 7,360 agricultural extension agents in Nigeria. Of these, 7,000 are employed by the government under the Agricultural Development Programs (ADPs) at the state level (Huber, Davis and Lion, 2017), and 360 are employed by seed companies. In addition to the ADPs, the National Agricultural Research Extension and Liaison Services (NARELS) of the Ahmadu Bello University (ABU) in Zaria also provides extension services in the country. NARELS is also partnering with the NASC in the area of seed extension services.

However, the number of extension agents given here does not include extension agents from several development-funded projects and private agro-based businesses that train and/or employ extension officers. Such projects include the DFID's CARE and MADE projects, USAID's MARKETS II project, and the World Bank's Fadama II project. The combined budget of these projects exceeds US$

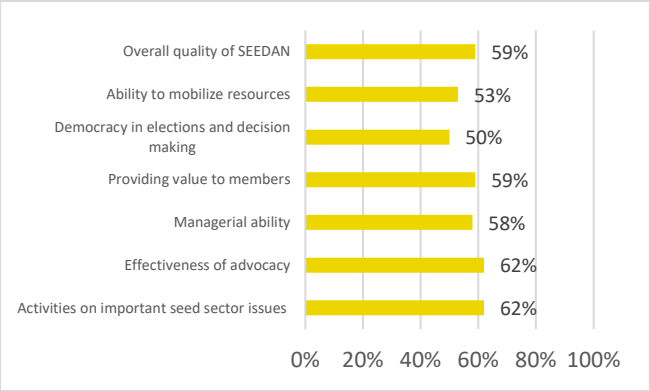

Figure 7: Performance of SEEDAN

100 million. Although agricultural extension may not be the primary focus of these projects, many do contribute to strengthening the country's extension system.

According to a 2016 study, the ratio of extension workers to farmers is estimated to be 1:5,000-10,000. As stated in the Agricultural Extension Transformation Agenda, the government's target is to reach a ratio of between 1:800 and 1:1,000 (Huber, Davis and Lion, 2017).

Most of the seed companies surveyed (34 out of 48) also employ extension officers. Given the low number of public extension workers, the seed companies interviewed rated their satisfaction with the adequacy of extension services as "fair" (59%). They noted that public extension officers are not usually considered to be effective in their work, as they are not well-funded by the state governments.

Quality of the national seed trade association

Formed in 1992 and registered by the Corporate Affairs Commission in 2008, the Seed Entrepreneurs Association of Nigeria (SEEDAN) is the umbrella association of the private sector seed industry in Nigeria. When SEEDAN was registered in 2008, only 8 seed companies were operational (Clive and Ajayi, 2010); by the end of 2018, SEEDAN had 72 registered members (25% of registered seed companies). Most of the seed companies in Nigeria were formed towards the end of 2014, and after the implementation of the GES. This is likely due to the fact that the GES raised awareness of improved seed among farmers and revealed the market potential for certified seed. However, when the program ended, most of the companies were either non-operational or produced and marketed very small quantities of seed. One of SEEDAN's key agenda items is to advocate for the payment of the sums still owed to the seed companies.

To gauge the performance of SEEDAN, seed companies were asked to rate various important aspects related to its mandate and functions. SEEDAN's overall performance was rated as "fair" (59%) (Figure 7).

SEEDAN is well-recognized as the platform for the private-sector seed industry in Nigeria. One of SEEDAN's major achievements is the supply of 180,000 tons of assorted certified seed to different states under the GES scheme. In addition to representing Nigeria's private sector in various regional and continental meetings, SEEDAN has played a key role in advancing the new Seed Act on behalf of the private sector. SEEDAN has a very good working relationship with the NASC and the FMARD and is well-recognized among all the key players in seed sector development in Nigeria. At the continental level, SEEDAN is a member of the Africa Seed Trade Association (AFSTA).

SEEDAN received the lowest rating from members in the area of democracy in elections and decision-making: 50%. This is likely because the association has not held elections since 2008, although there was a hand-over of leadership in 2013. Elections are supposed to be held every four years.

SERVICE TO SMALLHOLDER FARMERS

Concentration of rural agro-dealer network

The number of active agro-dealers in Nigeria is difficult to ascertain, as this information is not collected by the FMARD. That said, several organizations, including the Alliance for a Green Revolution in Africa (AGRA) and IFDC, are involved in strengthening agro-dealer networks. Under the NASC Act, all agro-dealers (referred to as 'seed dealers') must be registered. However, according to a recent speech by the Director General of the NASC, the NASC registered only 20 seed dealers in 2018. It is important to note that these seed dealers are registered following the standard operating procedures for the registration of seed companies.

Availability of seed in small packages

In 2017, only 9% of the seed of the four focus crops was sold in small packages (2kg or less). By crop, the percentage of seed sold in small packages is 11% for maize seed,

6% for rice seed, 27% for sorghum seed and 10% for soya bean seed (Figure 8). Seed companies' satisfaction with the seed sold in small packages is "good" for all crops: 78% for maize, 75% for rice, 74% for sorghum and 75% for soya bean.

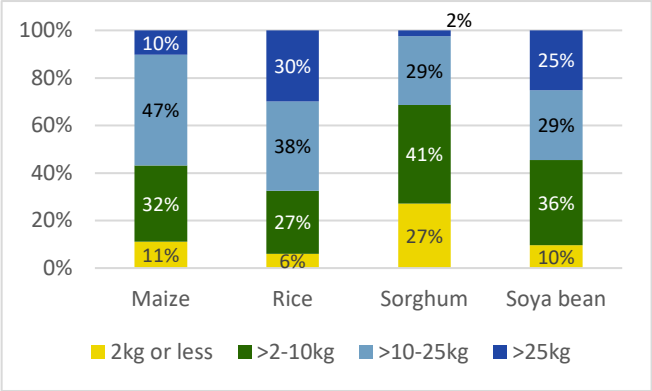

Figure 9: Percentage of seed sold in different package sizes

Seed-to-grain price ratio

Maize and sorghum have very high seed-to-grain price ratios at the time of planting: 5.8:1 for hybrid maize, 5.0:1 for OPV maize, and 6.7:1 for sorghum. Such a high ratio can motivate traders of counterfeit seed to buy grain from the market and package it as seed. The ratios for rice and soya bean are lower - 3.3:1 and 2.9:1, respectively.

However, a comparison with the prices per kg of hybrid maize in other countries paints a different picture. The average price per kg of hybrid maize seed in Nigeria (US $1.03) is the lowest among the African countries covered in the TASAI studies (Figure 9).

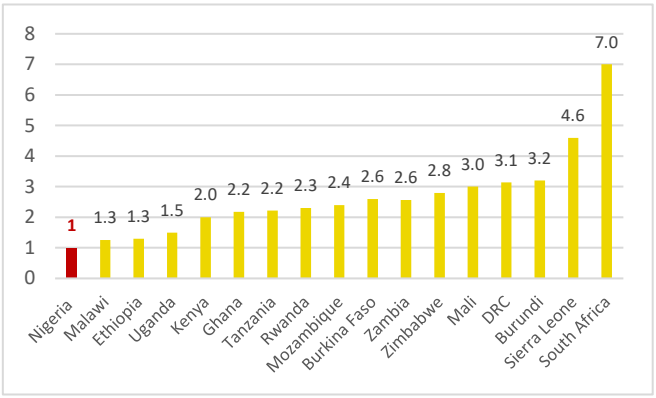

Figure 10: Price of maize hybrid seed (US$ per kg)

The price per kg of rice seed (US $1.1) in Nigeria is in the middle of the pack when compared against prices in other countries (Figure 10).

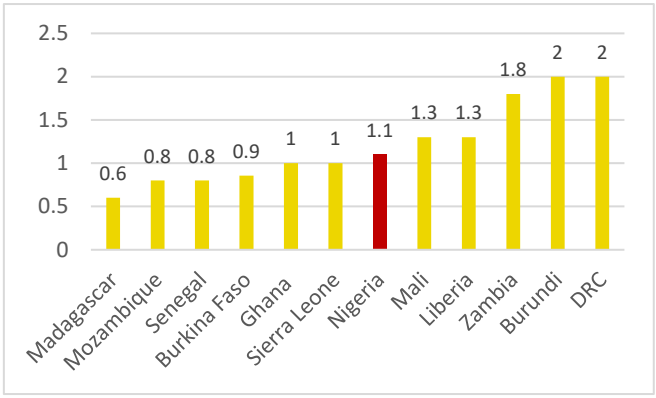

Figure 8: Price of rice seed (US$ per kg)

CONCLUSION

Nigeria's seed sector is in the growth stage of development. Since the percentage of farmers using improved seed is still low (below 15%), there is ample opportunity for the sector to grow. The TASAI study has revealed the positive aspects of the seed industry together with the challenges it faces, which will need to be addressed for the sector to reach its potential.

To highlight a few positive indicators: first, the government passed the NASC Act in 2019. The law provides a comprehensive regulatory framework for the seed industry. The law empowers the NASC to perform its tasks as the country's seed regulatory agency. Second, the NASC has worked proactively to counter the sale of counterfeit seed. It has done this through interventions including farmer awareness campaigns, the establishment of a Seed Inspectorate Unit, and the use of IT-based solutions such as the National Seed Tracker. In addition, the new law imposes hefty fines as a deterrent. Third, the number of seed companies in the country is growing. While most of these companies are still small in terms of production capacities, this is an indicator of a growing private sector. Lastly, the national seed association SEEDAN is gradually establishing itself as a platform for the private sector seed industry in the country. A vibrant association is vital as it provides for greater collaboration between the government and the private sector. However, despite these notable successes, there are still critical issues that need to be addressed:

Ensure seed quality control among seed companies.

The NASC should continue to strictly follow its established Standards of Procedures for seed company registration to ensure that only enterprises that have the capacity to

produce certified seed in line with the NASC Act and ECOWAS Regulations are registered.

The NASC should strengthen its seed inspection capacity. Despite having 50 seed inspectors, there is still a significant gap between the volume of seed inspected and certified, and the volume of seed sold to farmers. To fully comply with the NASC Act of 2019, there is a need to further strengthen the NASC's Seed Inspectorate Unit to ensure that all certified seed is inspected and certified before being sold. The NASC also needs to fast-track efforts to introduce private seed inspection to complement the public system.

To do this, the NASC would need to work closely with the private sector to assess the appropriate model for private seed inspection in Nigeria. Other African countries have tried and tested different models that Nigeria may adopt. For example, in Zambia, Zimbabwe and Kenya, private seed inspectors are attached to seed companies. In South Africa, private seed inspectors are employed by the South Africa National Seed Organization (SANSOR). Yet another alternative is a system whereby inspectors are employed by a third-party organization. This model was tried in Uganda, although it was later abandoned due to insufficient buy-in from the government.

The NASC would need to develop guidelines for private seed inspection services. These guidelines would include requirements for private seed inspectors, specific procedures for private inspectors, the NASC's role in the surveillance and auditing of private inspectors, and conditions for the withdrawal of inspectors, among others.

Pursue ISTA accreditation for the Central Seed Testing Laboratory

The NASC should complete the process of pursuing ISTA accreditation for the Central Seed Testing Laboratory to improve the quality of seed testing services available to seed companies. Under ISTA accreditation, seed would be rigorously tested and ISTA certificates would provide assurance of seed quality.

Seed companies, research institutions and the NASC should develop a system for planning, forecasting and monitoring seed production. Many seed companies are not satisfied with the supply of basic seed from the agricultural research institutions. One of the drivers of this problem is the unpredictable volume of demand for certified seed from institutional buyers, such as the various government agencies and NGOs. In total, nearly half of all maize and rice seed (47% for each) is sold to this category of buyer. The volume of seed procured by these organizations is unpredictable, making it difficult for companies to make accurate production plans, which in turn affect their requirements for basic seed requirements. The main players – seed companies, research institutions and the NASC – should develop a system to jointly plan and monitor the production of breeder and basic seed.

Seed distribution systems need to be built in the rural areas. Seed companies only sell about half of their maize (47%), rice (47%) and soya bean (53%) seed directly to farmers. Most seed is sold to institutional buyers, like government agencies and NGOs. Due to the high cost of establishing networks of seed dealers across the country, seed companies have not adequately invested in setting up these distribution systems.

The reasons for the low rate of variety commercialization should be investigated. Less than half of the maize (33%), rice (38%) and sorghum (46%) varieties that were released between 2000 and 2017 were sold in 2017. This implies that most of the varieties being developed by the public research institutions are not being commercialized by the private sector. As this is an indicator of ineffective utilization of public resources, the government and the private sector should interrogate the reasons for the low rate of commercialization and develop a more deliberate collaboration between seed companies and research institutions in the area of breeding and variety development.

The FMARD should fast-track payments to seed companies. The FMARD should fast-track the process of authenticating claims made by seed companies for payments for seed supplied to the government under the GES. In addition to processing these payments, the FMARD should work with the CBN to address the issue of seed companies that have been blacklisted by commercial banks.

SEEDAN should strengthen its efforts as a platform for the seed industry in Nigeria. SEEDAN is actively engaged in the key seed industry activities in the country. To improve on its performance, SEEDAN should proactively reach out to its current members in order to better understand their priorities and expectations. In addition, SEEDAN should seek to expand its membership, since around 75% of the registered seed companies are not members. Lastly, SEEDAN should improve on its governance to ensure that all governance instruments are in

place and are being fully implemented, including the timely conduct of the election of its leaders, as this was one of the main concerns raised by members.

Strengthen agricultural extensions systems. The public extension system is not very effective, and most seed companies interviewed (34 out of 48) have resorted to relying entirely on their own extension staff. However, seed companies cannot employ adequate numbers of extension officers to reach farmers across the different states in a timely manner. Given the shortage of public resources, the government should develop and implement a strategy of collaboration between the different extension service providers in the country. These would include programs funded by development partners and implemented by NGOs, seed companies and other private businesses, public and private universities and public and private agricultural research institutions. The strategy should be coordinated and managed at the state level.

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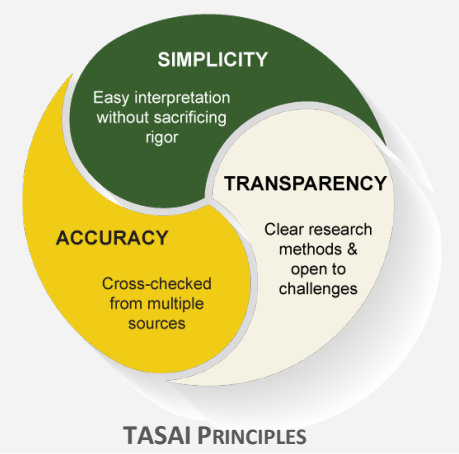
APPENDIX 1.

For a comparison of TASAI Indicators across different countries, please visit: http://tasai.org/wp-content/uploads/TASAI-Appendix-CURRENT.pdf

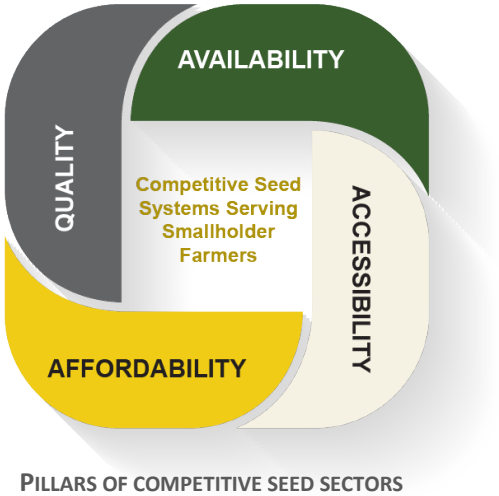
ABOUT THE AFRICAN SEED ACCESS INDEX

The African Seed Access Index (TASAI) is a seed industry research initiative housed at **Market Matters Inc.** (MM Inc.). **TASAI's goal** is to encourage African governments and other seed industry players to create and maintain enabling environments that will accelerate the development of a vibrant private sector-led seed system serving smallholder farmers. It is this enabling environment that TASAI seeks to measure, track and compare across African countries.

To assess the status of the seed industry value chain, TASAI employs **20 indicators** grouped into five categories: **Research and Development, Industry Competitiveness, Policy and Regulations, Institutional Support** and **Service to Smallholder Farmers.**



TASAI PRINCIPLES



PILLARS OF COMPETITIVE SEED SECTORS

By the end of 2019, TASAI studies will have been completed in **21 African countries**: Burkina Faso, Burundi, Cote d'Ivoire, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. In each country, TASAI **works closely with local seed industry actors**, government and international development agencies to share the TASAI findings and to identify the next steps for creating a vibrant national seed sector.

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Suggested citation:
Michael Waithaka, Mainza Mugoya, Adesola Ajayi, Folarin Okelola, Krisztina Tihanyi. 2019. *Nigeria Brief 2018 - The African Seed Access Index.* Available at: tasai.org/reports

The work of TASAI is supported by: