This summary report is based on feedback taken from expert consultations on the Early Generation Seed Study, commissioned by the United States Agency for International Development (USAID) and the Bill & Melinda Gates Foundation (BMGF) and carried out by Monitor-Deloitte.

The findings and conclusions contained within do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation nor USAID.

© 2015 Bill and Melinda Gates Foundation
Contents

Executive Summary ........................................................................................................... 4

1. General Feedback ........................................................................................................ 5
   1.1 Economic Framework and Archetype Model ......................................................... 5
   1.2 Profitability ........................................................................................................... 6
   1.3 Role of NARS ....................................................................................................... 7
   1.4 Role of the Private sector .................................................................................... 7

2. Market Archetype 1/Hybrid Maize in Zambia ............................................................. 7

3. Market Archetype 2A/Sweet Potato in Tanzania ....................................................... 8

4. Market Archetype 2A/Rice in Nigeria ......................................................................... 9

5. Market Archetype 2B/Cowpea in Ghana .................................................................. 9

6. Market Archetype 3/Sorghum in Ethiopia ................................................................. 10

7. Government and Donor Recommendations .............................................................. 10

8. Missing from the Study ............................................................................................. 12
Executive Summary

With the aim to increase agricultural productivity among smallholder farmers in Sub-Saharan Africa, structural investments are made in crop improvement of food crops. Only if smallholder farmers have access to quality seed and planting materials of the improved varieties, can they take advantage of this increased productivity. Several systemic problems exist, however, that hamper the production and marketing of quality seed and planting materials of improved varieties. The production and delivery of early generation (breeder and foundation) seed continues to be one of the major bottlenecks hampering the functioning of seed value chains of major food crops. Although commercial models exist for promoting the production and delivery of early generation seed (EGS) of improved hybrid maize varieties, different models are required to reach scale and sustainability for the production and delivery of EGS of improved varieties for crops such as rice, various legumes, sorghum and millets, and especially for root and tuber crops. The Bill & Melinda Gates Foundation and the United States Agency for International Development (USAID) are exploring ways to encourage the development and promotion of appropriate models for the production and delivery of EGS of improved varieties for a diversity food crops in Sub-Saharan Africa.

In order to assess the topic of EGS, the Bill & Melinda Gates Foundation and the USAID commissioned a study to Monitor-Deloitte. The team developed a generalizable framework that enables policy makers and donors to tailor their policies and interventions to the needs of specific crops based on market conditions, which are referred to as market archetypes. The archetypes are determined by (a) marginal economic value of quality seed of improved varieties and (b) the level of demand for varieties or crops grown with quality seed of improved varieties. The study recognizes, however, that several other factors contribute to a well-functioning seed sector. These include, but are not limited to: policy environment; value chain capacity and resources; quality assurance mechanisms; and enabling environment. Based on a set of representative countries (Ethiopia, Ghana, Nigeria, Tanzania and Zambia) and crops (maize, rice, sorghum, cowpea, common beans, cassava and sweet potato), the study provides examples of potential business models that could scale the production and delivery of EGS in a commercially sustainable manner. In the case where the public sector still plays a role, the study outlines opportunities for public-private collaboration and increased efficiencies in the sector. Finally, the study concludes by providing generalizable principles and recommendations to help guide key stakeholders as they pursue policies, investments, and interventions.

This synthesis report summarizes the conclusions from 23 external technical experts who provided critical feedback on the study. These experts were asked to review a draft report and comment on the accuracy of the information and the validity of the conclusions to ensure that the recommendations are grounded in fact so that the study can be a useful tool for donors, governments, and other stakeholders when designing and pursuing future interventions. These individuals include individuals from IFDC, ISSD Ethiopia, DAI, AGRA-PASS, private seed companies, universities, FAO, CIAT, CIP, IFPRI, ICRISAT, ASARECA, CORAF, and the Royal Tropical Institute. The feedback was anonymously compiled and grouped into themes. This feedback has served as key input into the finalization of the study. We are very thankful for the contributions from the reviewers, who spent much of their time reviewing the study and providing critical feedback. Many of them also served as interviewees for the development of the study.
1. General Feedback

The reviews were generally supportive of the overall economic and archetype framework and the description of the seed value chains and their ideal states. Reviewers praised the study for the usefulness of the framework as being highly reflective of the actual situations in the various countries and giving a clear indication of the things to take into account for EGS. There were, however, some conflicting opinions regarding the universal applicability of the framework, as well as differences with the proposed roles of various actors throughout the value chain. Additional questions pushed for a better understanding of demand to inform production and a more transparent analysis of profitability, which may not have taken into account every cost. The list of recommended policy actions and roles was lauded for its comprehensiveness, although more prioritization is needed in order to lead to concrete action.

General feedback on overall concepts is captured throughout the rest of this section, while more theme-specific comments are elaborated in additional sections.

1.1 Economic Framework and Archetype Model

The economic framework’s viability of using excludability/rivalry to define public/private goods was generally accepted, with a few critical caveats. Some said the economic framework was a good attempt to describe the existing situation, while others claimed that the framework worked well for seed production (private good), but not automatically for EGS (and foundation seed) production, as EGS is not a fully private good and is connected to public varieties in the absence of intellectual property. Other comments were more critical, saying that the application of excludability and rivalry to seed markets and EGS is entirely inaccurate because “none of these key variables explain how quality seed of improved varieties are excludable or how demand for crops and varieties are rivalrous.” The framing is “more of a production/supply approach rather than trying to understanding demand and then developing a system to deliver what farmers need.” Furthermore, the economic analysis could be widened to include the economics of quality seed use by farmers along with the commodity value chain analysis.

It was noted that there is relatively little analysis on the marginal economic value of quality seed of improved varieties in reference to farmers, i.e. the additional benefit stream generated by using quality seed relative to farmer saved seed or alternatives, which would be necessary to “gauge farmer demand for new varieties.” Instead, the study is related more to the economics of EGS production, and appears “very linear and supply driven/top down.” Other constraints to the analysis mentioned are that because seed is so often subsidized, the true demand is not apparent, or that because there is so much long term institutional demand for seed, the “real demand” is itself hard to pick out. The nature and causes of demand risk for early generation seed should be better articulated, particularly how this risk is created by actions of the public sector, non-governmental organizations, and donor programs. Furthermore, it is unclear if there is sufficient understanding of the dynamics of farmer seed demand, i.e. tradeoffs between price, source, accessibility, quality and quantity. Farmer demand is about knowledge and awareness related to varieties, quality seed, best agronomic practices, as well as ability and willingness to pay, and that needs to be taken into account. Demand for new varieties and demand for quality seed cannot automatically be translated into demand for EGS (notably foundation seed). There is also demand for small amounts (varieties) and quality starter seed (local varieties from gene banks, certified seed, etc.) for
semi-formal and informal seed systems. Furthermore, this marginal economic value of quality seed of improved varieties depends on multiple factors beyond ‘quality seed’ and ‘improved varieties’. There seems to be an assumption that in all cases the hypothetical yield gap is primarily an issue of variety and quality, and that this marginal economic value (utility) is static as opposed to dynamic. It may be more realistic and useful to start with farmer demand – for quality seed and improved varieties – as the first dimension to consider for different archetypes.

Although generally reviewers accepted the market archetypes, there were a few critiques of the language, as it ascribed more universality to the models than was deemed appropriate. The archetypes as “ideal models” is mischaracterized as there are not enough cases examined to make the claim and the study excludes the dominant seed market in Sub-Saharan Africa, which is informal. The informal seed market shapes the overall demand function historically and currently, and “promotion of the formal sector may not be the best approach.” Moreover, the countries selected are large ones, introducing size bias into the market typology and the country/crop pairs selected are more representative for seed propagated cereals, than they are for legumes or root and tuber crops.

The framework doesn’t acknowledge that the different market archetypes could exist concurrently for a crop in the same country. Common bean, cowpea, and sorghum are listed within the public sector dominant archetype, but sweet potato and cassava could easily fall under this archetype. Instead, RTBs are listed only under public-private archetypes, but the description of that archetype could be made about any crop, depending on the context. There could be more than four boxes since the seed sector/industry is always evolving as is the relationship between the public and private sector. Factors that were overlooked in determining the archetypes include the influence of donor interests in driving research and development, cultural norms and social constructs, and the agro-ecological and socioeconomic heterogeneity found in individual country’s markets.

Some comments focused on the niche archetype. Even in the ideal state, one would expect more of a public-private sector initiative than entirely through the private sector. Since the public sector has access to larger germplasm material compared to the private sector, selective breeding for a specific niche might require the private sector to depend on public sector research. Additionally, many niche players are not noted in the analysis, i.e. commercial farmers who also produce or import their own parent seed, and there may be large untapped potential here.

1.2 Profitability

Some reviewers questioned the fundamental profitability of the business models. There was a lot of reliance on public and not-for-profit entities within the models, and, particularly for OPV sorghum, there was skepticism whether a business plan would be sustainable. It was acknowledged that it is difficult to have foundation seed production and sale as a viable business case unless it is linked to services (BDS, financial services) or seed production (e.g. ASA). Examples have shown that the business proposition for foundation seed production is not strong, which explains why there are very few examples of standalone foundation seed-producing private companies. These companies are increasingly facing international competition.
1.3 Role of NARS
The majority of reviewers generally disagreed with how NARS were portrayed throughout the analysis. The national breeding efforts by NARS should have received more recognition, and their work in releasing varieties should not be discounted. Breeding programs in SSA are largely public, and the role of public sector in foundation seed production is stronger than illustrated in the study. IARCs are not as dominant in breeding as they are being described to be. The ideal state portrayed where CGIAR is responsible for much of variety research and development is considered by a reviewer as “dangerous”.

1.4 Role of the Private sector
Most of the reviewers agreed that the role of the private sector should be emphasized even more. From the perspectives of specialization, plus efficiency, plus eventual self-perpetuation, contracted private sector multiplication should be given more attention. There is room for some of the alternative private sector approaches, such as Quality Declared Seed and formally licensed multipliers, to be part of the discussion.

The study does not seem to give any recognition to the very important marginal profitability that comes from the private sector producing and selling seed other than hybrid maize. While the activity of producing and selling seed of non-maize crop varieties, by itself, may not be profitable on a stand-alone basis, it can be a critical addition to profitability for a seed company which is also producing hybrid maize, or for a large commercial grower who needs a crop for rotation and wants to pursue a value-added crop such as legume seed. Nor is there sufficient weight given to the critical nature of foundation seed quality, quantity, and timeliness for private sector operations. For government, IARCs, or NGOs/not-for-profits, lack of this seed does not close them down, but for the private sector, it does. In many cases these shortages catalyze years of struggle and business risk, and can even cause financial ruin. The current situation of private sector involvement or non-involvement in EGS of all crops is more determined by country policy and/or practices, than private sector interest in a specific crop and role in EGS production. Additionally, there is an assumption that the typical private sector model is the full blown seed company, when there are many other variants which may be useful to consider.

2. Market Archetype 1/Hybrid Maize in Zambia
This archetype/country-crop example elicited differing opinions from reviewers. Some agreed with the framing and conclusions and lauded the description of the seed system, while others disputed a few of the points. Some questioned why the study included maize in the first place, given that EGS in hybrid maize “does not seem to be a significant problem warranting donor attention/investment and there seems to be a recognition that there has been an over-investment into maize.” Furthermore, “the fundamentals of hybrid maize (out-crossing) are starkly different from nearly all other crops, which of course has a profound impact on the facility of commercialization and the associated ‘business case’ for EGS.”

Moreover, the case of hybrid maize in Zambia is such a unique case that it doesn’t fit from which to develop a model. Zambia is unique selling hybrids at 3500 USD/ton, while East Africa hybrids in general sell at 1800 to 2200 USD/ton. Due recognition also needs to be paid to the role that the collapse of Zimbabwe’s agricultural economy and land nationalization had on the Zambian agricultural economy. It was and is the political economy of Zimbabwe and the opportunistic response of Zambia that has shaped the structure of commercial maize seed demand in Zambia. The ideal state presented, which is driven by
the unique agro-ecological and market conditions of maize in Zambia, would likely not operate the same or as well in a country where farmers are far more widely dispersed in geographic terms, where infrastructure and credit facilities were more limited, and where the market for maize grain itself was marginal. It remains to be seen whether this private sector-led investment model would still work, and if farmers would be willing to purchase hybrid maize seed at levels and rates sufficient to sustain a commercial maize seed sector without intervention from the public sector. Where the seed system is still nascent, the Zambia hybrid maize approach/recommendation may not apply.

For the reasons mentioned above, many of the reviewers disagreed with the ideal state. They disagreed that government should withdraw from the last stage of the value chain in favor of private players because there are elements of public extension (input distribution and agronomic service provision) that cannot simply be replicated by private services. Moreover, this industry still depends largely on subsidized support, which is part of what attracts the private sector to it. They also disagreed that ZARI should withdraw from all stages. It is true that ROI for ZARI on maize research is not warranted, but it is important that ZARI maintain the lines and invest on few specific traits that are not the focus of private sector. Often private sector (especially small to medium sized) firms still depend heavily on parental lines from the public sector (NARS) since in few countries (like Kenya) the exclusivity of IARC’s material to few firms prevents others from expanding their market. Maintenance of lines is expensive especially for small to medium sized firms with a limited portfolio of varieties to offer, further necessitating ZARI’s contribution. If parent line maintenance were controlled by the private sector, laws would need to be enforced to promote sharing of this material.

There were further questions whether breeding can be taken over completely by the private sector. The working experience in Uganda is that there are too many seed companies dealing in hybrid, as access to hybrid lines has improved (full research pipeline, etc.). The second observation is that those companies are not willing and able to invest, as they see hybrids as profit making and they are accustomed to the NGO model. The companies keep complaining that foundation seed is a problem, but if it is available, they are not willing to pay for it. There is no willingness to invest in market development nor serving smallholders, and thus they get stuck with product, resulting in carryover stocks, and poor quality at dumping prices. Furthermore, it is unclear if CIMMYT can work with domestic firms directly and circumvent the NARS.

Many of the reviewers agreed with the roles of government/donors to overcome the barriers to a profitable hybrid maize seed value chain. The only comments centered on the suggested roles relating to market linkages and data availability. The suggestion to develop a business case has already been proven, and many of the innovative solution prototypes (like mobile-based seed ordering to aid in distribution planning) have been tried unsuccessfully. The best approach for these actors is to create demand, and then smartly supply it using and cultivating sales networks.

3. Market Archetype 2A/Sweet Potato in Tanzania

Reviewers had a few disagreements with how sweet potato was presented within the analysis, even some claiming that sweet potato does not fit within this archetype. The difference between seed as opposed to planting material systems, with an emphasis on disease control, did not come out strongly enough in the analysis. The demand for this material was underestimated, considering the extent to which growers
purchase vines from each other or specialists following the dry season. The lack of demand for OFSP was also contested, as there are claims on both sides (evidence should be cited), and skepticism was shared regarding the assertion that $500K worth of seed would be purchased in Tanzania. Reviewers also seriously questioned the profitability of tissue culture labs, given that “*a lot has been invested in this route to commercialization, but there seems to be very little evidence of success in the African context to date.*”

The ideal state presented posed some concerns with reviewers. It seemed to assume a single crop model, but sweet potato likely has to be subsidized by coffee and banana TC production. It wasn’t clear who will fund the production of breeder’s seed on a long term basis. And requiring that the public sector guarantee demand (although the “how” isn’t specified), is “*a very serious commitment of public resources that has failed more than succeeded in the past.*” Additionally, it reads top-down, supply rather than demand driven. The ideal state should be working toward a vision where QDS and basic seed producers are creating/maintaining the demand (which is driven by farmer demand) for pre-basic/foundation seed production. One reviewer questioned the ability to speculate on an ideal state when we “*don’t know the value proposition to growers,*” which should be understood before thinking through partnerships and who does what.

4. Market Archetype 2A/Rice in Nigeria

Few comments were brought up about this case study and archetype example. A key issue about imported rice is not just that consumers prefer it, as noted in the study, but that, for all the West African rice-eating countries, imported rice is cheaper than locally produced rice for a variety of reasons. How to deal with this is the real issue. Reviewers wanted more thought to be paid to small seed businesses involved in rice seed production who require quality starter seed and enhanced coordination; options for the privatization of quality assurance; and alternatives to foundation seed production other than phasing out the public sector, which just didn’t “*make too much sense given the high fixed costs.*” One missing element from the analysis was discussion on rice hybrids; though Africa is not ready yet, “*the private sector can dominate this segment as happened in other countries.*” In India, for example, OPV R&D and the OPV market are dominated by public sector cultivar, while hybrid rice R&D and market is dominated by the private sector. It should be considered that the government should withdraw from the production and market of foundation seed and leave it solely to private sector in the ideal state.

5. Market Archetype 2B/Cowpea in Ghana

There were contradictory opinions from the reviewers regarding the profitability of cowpea. Some pointed toward evidence from Kenya that small/medium seed companies have and will invest in foundation and certified seed production of legume seed, especially if purchases are linked to credit. It might also be valuable to study the system that evolved in western Canada over the past 30 years for legumes. And, if varieties are protected, this would increase profitability of breeder seed. That being said, enforcing a system that collects royalties may be difficult. The point that variety release is slow is a bit near-sighted, as there is always scope for speeding up the process and reducing unit costs as a means of speeding up the breeding to seeding cycle. A key point is where the foundation seed system occurs, and is there reasonable access to off-season multiplications when necessary.

Others claimed that the ideal state presented is just not realistic because this value chain is simply not profitable and the assumption that certification of seed adds value that farmers are willing to pay for is
The absence of NGOs in marketing and distribution was questioned as well, as they may have a role to play in providing/support extension services including popularization of new varieties. The low demand for improved varieties will continue because most legumes are often inter-cropped with maize and are not the primary crop. Reviewers questioned who would be the primary buyers of cowpea seed, and in the absence of NGOs (who are the usual purchasers), would there be a real market with farmers being the primary buyers. To increase sustainability, reviewers suggested including Farmer-based Organizations or SEEDPAG (in Ghana) along the value chain in the ideal state.

6. Market Archetype 3/Sorghum in Ethiopia

Of the few comments about sorghum in Ethiopia, there was a general sense that the analysis was missing a few elements, or that this archetype is not really representative of many countries and is one that seems derived from a particular situation. The focus of R&D should be about replacing the existing sorghum OPV with hybrids so that Ethiopia can be competitive. There was discomfort with the high price of fixed costs, particularly for breeder and foundation seed. Additionally, the ideal state described sounded unachievable given the political administrative structure and power struggle between EIAR and RARIs, as well as the high agro-ecological diversity of Ethiopia. The local seed business model that has been developing in Ethiopia was completely ignored in the analysis. Some reviewers argued that the public sector does not have to support all parts of the value chain; they wanted to include the private sector in the distribution and marketing, for one.

7. Government and Donor Recommendations

There were mixed reviews regarding the practicality and degree of specificity of the recommendations. While some supported the given recommendations, many cited that “the large number of recommendations provided little direction,” that they were “artificial” and “too general to provide much insight beyond what is already known.” Reviewers requested a focus on the key policy changes that would make the most difference. Some wanted a stronger link between the government recommendations/actions and those of the donors, and to better understand how donors work with governments to achieve these goals.

Others thought the framing within the two categories was incomplete. For instance, the two categories were seen to be so market-focused that they didn’t take into account that research capacity is dwindling, which will lead to a lack of varieties sooner rather than later. Moreover, the political economy should be factored in, either as a separate heading, or with the constraints imposed by the enabling environment. The role of local seed businesses (intermediary seed producers who are neither public nor private) are completely ignored, and they can often do what the public and private won’t. Additionally, there were not any recommendations related to tweaking the private sector model, or to availing lower cost financing to already functional and ready-to-expand private sector companies. For the market archetype-specific recommendations, it was advised to use different business models (including a mix of commercial and institutional buyers) because tendered seed subsidies lead to different seed business models as well as to exclusion of smaller seed companies.

A few specific recommendations were called out as unnecessary or problematic. IP was not considered a priority given it takes decades to implement and isn’t as important for the non-highly commercial crops. Many stated that promoting a reliable QA mechanism is not about capacity building and technical
knowledge, as indicated in the study, but about the desire to enforce. The efforts to reduce transport costs were deemed to be based on the incorrect assumption that transport costs are high, or at least higher compared to management costs. The proposed partnership between seed companies and breeders were not considered realistic. The recommendations to build the capacity/skills of local breeders could be problematic because, in many cases, once they are developed, they are absorbed either by the IARCs or private firms (as the incentives and better research environment are better) than NARs facilities. The proposed roles of governments and donors to remove market distortions were not considered effective when “the largest market distortions come from the state of the macro-economy in many SSA states, especially related to the currency risks for the high proportion of hard currency costs in early generation seed, the risk-adjusted cost of financing local currency costs, and/or the availability of cash during periods of macro-stress.”

Still other reviewers suggested additional recommendations, including:

- For governments:
  - End seed import restrictions – not all countries need to produce all seed of all crops
  - Implement seed sub-regional harmonization protocols for variety registration, seed production, and seed movement
  - Ensure all seed policies are clear and transparent
  - Make the variety release process and committees independent from NARS (separate independent entities – Kenyan model) and make decisions based on market demands
  - Avoid public monopolies on EGS production

- For donors:
  - Care not to distort markets and crowd out private sector through seed subsidies and distributing free seeds, etc.
  - Develop better models of economic return for market demand estimation, especially as other crop traits begin to be added to the value calculus (vitamin and mineral loading, drought tolerance, weed competition and pest/disease tolerance in organic production systems, genetic diversity as an environmental resilience service, etc.)
  - Address the lack of effort to determine the value proposition to the seed purchaser/grower of adopting quality seed

- For both:
  - Build the private sector capacity to implement a QA system
  - Figure out the best way to reduce the fixed costs of foundation seed production (whether it’s due to salaries\(^1\) (involve more skilled contract growers); infrastructure (use less sophisticated irrigation md machinery); and/or inputs (possibly breeder seed can be subsidized, other inputs)

Some tried to take a stab at the most important government actions. These include harmonization to lead to economies of scale for foundation seed production; matching supply and demand of varieties and related seed; involvement in breeder seed production of public varieties; enhancing the interaction between public and private breeders in order to use each other’s varieties in breeding programs; and

---

\(^1\) Another way to decrease the cost of breeders is to involve them in other seed systems and by increasing the amount of released varieties dramatically (five-fold according to an IFPRI study).
participatory breeding (to reduce fixed costs) and formalizing the feedback mechanism (seen as the root of the marginal value chain calculus, which could lead to a questioning of the catalogue system itself).

Some tried to take a stab at the most important donor actions. These include seed value chain planning based on deepened trend analysis; the development of business cases for foundation seed production for formal, intermediate (QDS), and informal seed systems; and promoting and planning for a more demand-driven orientation of the seed value chain.

Ultimately, sustaining a (seed) value chain based on the support of government/donors is a big challenge. It is prudent for governments/donors to inject the needed starter capital, but later it is desirable to examine all factors that are limiting to gradually reduce the dependence. On the enabling environment, there are several critical factors, including existence of the regulatory regime, implementation of the regulatory regime, and the non-existent regulatory regime. All of these have significant effect. Even though public sector seed companies could be encouraged, governments should be seen as providing the enabling environment/level playing ground for all and not competing with the private sector.

8. Missing from the Study
The reviewers raised many points they thought should have been further elaborated on within the study:

- The study does not provide the depth of analysis to support the hypothesis that EGS is a key constraint in the target countries. The ‘archetypes’ for each country do not provide an in depth analysis that explains the supply and demand issues that point to a problem in EGS.
- It is recommended to go beyond the scope of EGS because there is so much more involved in providing quality seed to farmers than EGS. In fact, the recommendations go beyond the scope of EGS, but there is no analysis on the other factors.
- Farmers’ organizations and state owned corporations were excluded from the study and should not be overlooked, as they play a key role in foundation and quality seed production.
- The study does not bring other seed distribution pathways into the picture, such as ‘relief seed markets’ or what happens when there is a disaster, “which is often the case in many of these countries for the crops specified.”
- This report should have at least some mention of the barriers to imports and exports of new varieties/hybrids and seed which is mainly important for the private sector cases (archetypes 1 and 4). These are primarily due to the mandatory registration system which requires years of testing and may not approve some useful varieties.
- The overviews are fine but more important would be to understand not the “what” but the “why”? Why is there limited demand for improved varieties? What are the costs of production and markets that farmers have access to? Policy makers want to know why and what to do about it.
- It is unclear where existing systems would fit in, such as AGRA-PASS initiatives (on foundation seed enterprises), AGRA R&D initiatives, and varieties released through these initiatives, as well as other community based initiatives and informal markets.
- One aspect that was not really covered in most of the 2b section is the opportunity of enhancing the rate of change through linkages with universities and other educational venues. Ultimately change comes through the younger generation as they grow older. Ideally they should be linked up with the much smaller segment of older people who welcome change. Identification of potential strategic off-season seed multiplication sites would be a useful tool.
The report misses the importance of private variety introduction. Without addressing that issue, everyone is playing with too few varieties. More seed of limited numbers of varieties is likely to have no more than an insignificant impact on farm production and incomes.

There is a missing element to the study which relates to what happens to demand when supply becomes stable. The study seems to assume static supply and demand behavior. (E.g., farmers will not regularly buy fresh bean seed, or cowpea seed – when the reality is that they have seldom had a readily available supply of it.)

The role of seed and other policies is further not captured in the framework, which is an important oversight because in many West African countries, seed is not viewed as a market good traded between suppliers and consumers but as within the government domain.