Development of Anti-Counterfeiting Program in East Africa

Summary of Project & Next Steps

This report was prepared for the Bill and Melinda Gates Foundation in collaboration with Monitor Deloitte

Bill and Melinda Gates Foundation Team: Walter de Boef and Orin Hasson
Monitor Deloitte Team: John Mennel, Pradeep Prabha, Joel Bryce, Nikhil Bumb, Michie Adachi, and Kelsey Anderson

For more information, contact Walter de Boef at Walter.deBoef@gatesfoundation.org or Pradeep Prabha at pprabhala@deloitte.com
## Table of Contents

- **Initial Seed Sector Assessments & Hypotheses**
  - Insights from In-Country Research & Interviews
  - Recommended Path Forward
  - Appendix: Reference Reports
We conducted initial industry assessments of the Tanzanian and Ugandan seed sectors; Tanzania is a relatively large seed sector, although it is dominated by the informal sector.

**Industry Size and Overview**
- 54 private seed companies have been registered in Tanzania
- Total Demand: ~212,000 MT per year
- Total Sales from Formal Seed Market: 10 – 15,000 MT, only about 4 - 6,000 MT are produced locally
  - Most imported seeds are from multinational corporations, primarily from Zimbabwe and South Africa
- Key challenges for seed companies include insufficient numbers of contract growers, low quality seed, lack of storage facilities, shortages of trained staff, and other infrastructure challenges
- Any promotion or marketing is carried out by individual seed companies

**Tanzania Seed Market**
- In the Formal Seed Market, 79% of improved seed comes from the private sector; 21% comes from the government
- Informal markets continue to dominate due to:
  - Local companies not having the necessary capacity or facilities to process foundation seeds
  - Certification and release of new seeds can take up to three years
  - The high cost of improved seeds, and farmers’ lack of awareness of the use of improved seeds for higher yields

**Market Breakdown, by Crop**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Formal Seed Market</th>
<th>Informal Seed Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>13%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Sorghum</td>
<td>7%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Sunflower</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Paddy Rice</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td>0.2%</td>
<td></td>
</tr>
</tbody>
</table>

**Seed Regions**
- Maize, sorghum, patty rice, millet, and oil seed crops are most common in the Central zone
- Maize, beans, potatoes and wheat are the main crops in the Southern Highlands and Northern zones

**While food crops and cash crops are prevalent in Tanzania, food crops dominate the market:**
- **Top Food Crops**: Maize (largest production), Rice, Sorghum
- **Top Cash Crops**: Cotton, Sugar, Cashewnut / Cassava

Source: (1) AGRA-PASS MTR, 2010; (2) Interviews with Tanzanian advisors; (3) Aline East African Synthesis Report, 2011; (4) Tanzania Country Report, 2009; (5) BMGF Tanzania Seed Sector Assessment; (6) The World Bank Agribusiness Indicators: Tanzania
Maize is the most important crop in Tanzania – accounting for ~31% of total food production; as a result, it experiences the most counterfeit

Maize Seed in Tanzania

- Improved Varieties: 67%
- Unimproved Varieties: 33%

% Breakdown of Maize Seed Market

The AGRA-PASS program has worked to hybridize 23 maize seed varieties over the past 30 years

Maize Production

- Maize is grown by more than 50% of Tanzanian farmers and covers 45 percent of total arable land and generates close to 50% of rural cash income.
- There are 55 maize seed varieties officially approved for commercialization, the most of any crop.
- Small-scale farmers dominate maize production in Tanzania, accounting for 85% of the total production; medium and large scale farmers account for 10% and 5% respectively.
- Though certified seed production is more lucrative for farmers (TZS 850/kg as opposed to TZS 300 for grain maize), there are several challenges that limit certified seed use, including higher retail price, inadequate TOSCI inspections leading to counterfeits, and limited use of CPPs and fertilizers.
- In 2010, 89% of the commercially-sold maize seed was imported.

Maize Seed Packaging

Maize seed is typically sold in 2 kg bags, packaged by the seed company.

Top seed companies: SeedCo Ltd, Sub-Agro, Pannar Seed, Kibo Seed Ltd, Highland Seed, and Monsanto.

Where Smallholders Buy Maize Seed

- Local Agro-Dealers: urban and rural retailers (formal market)
- Farm-Saved Seed: seed from a farmer’s own farm (informal market)
- Neighbor: seed exchange (gift, barter, or sale) between neighboring farms (informal market)
- Local Market: local and improved grain and seed varieties sold from local farmers, wholesalers, and retailers (formal and informal markets)

Frequency among surveyed farmers:

- Local Agro-Dealers: 50%
- Farm-Saved Seed: 44%
- Neighbor: 22%
- Local Market: 19%

Totals more than 100% because respondents could select more than one answer.

Source: (1) AGRA-PASS MTR, 2010; (2) Interviews with Tanzanian advisors; (3) MAFAP Maize In the United Republic of Tanzania, 2013; (4) PASS Evaluative Case Studies – East Africa; (5) AGRA-PASS survey of 200 farmers in Kilosa and Meru districts; (6) The World Bank Agribusiness Indicators: Tanzania; (6) The World Bank Agribusiness Indicators: Tanzania.
In Tanzania, the private sector relies heavily on government for support and guidance; however, government agencies lack resources and capacity to effectively regulate the market.

**Key Players**

**Agricultural Seed Agency (ASA)** – Mandated to produce, process, and market agricultural seed as well as provide all foundation seed for varieties bred from public institutions; currently operates five government seed farms and seed processing facilities.

**Tanzania Seed Certification Institute (TOSCI)** – Mandated to manage seed production quality and regulation.

**National Seeds Committee** - an advisory body to the Ministry of Agriculture, Food Security and Co-operatives (MAFC), underrepresented by seed companies, agro-dealers and farmers (negative implications for lobbying of favorable policies)

**Relevant Seed Regulations**

**Seed Act of 2003 and Seeds Regulation of 2007**: Created regulations on importation, exportation, production, processing, distribution and sale of seed, establish TOSCI (Tanzania Official Seed Certification Institute) the sole seed certification agency.

**Protection of New Plant Varieties (Plant Breeders Rights) Act, 2002**: Introduced new and independent protection system for plant varieties cannot be registered under the Patents Act (grant and regulation of patents, utility certificates, and innovation certificates).

**Tropical Pesticide Research Institute Act of 1979**: Regulates the production, importation, distribution, sale and use of pesticides.

**Steps to License Seed Product and Company**

1. **Importer or Manufacturer of Seeds**
2. **Register Product & Company with Ministry of Agriculture**
3. **Keep Detailed Records of Seed Produced, Purchased, Sold, Tested, and Labeled**
4. **Get New Plant Variety Approved by the National Seeds Committee**
5. **Random Sampling or Testing of Any Seed Can Be Conducted at Any Time The Tanzania Seed Certification Institute (TOSCI)**
6. **If Seed Does Not Pass Inspection, A Stop of Sale and Seizure of All Seed Can Be Issued**
7. **If Seed Passes Inspection, The Ministry of Agriculture Approves Seeds For Continued Sale**

Source: (1) Seed Act of 2003; (2) AGRA-PASS MTR, 2010
Like Tanzania, most seed in Uganda is distributed through informal channels

Industry Size and Overview
- There are 23 seed companies licensed and certified by the Uganda Seed Trade Association (USTA)
- Total Demand for Grain Crop Seeds: ~110,580 MT
- Total Sales from Formal Seed Market: ~12,000 MT
- Supply shortages create incentives for substandard seed and counterfeiting; studies suggest counterfeiting affects ~30-40% of purchased seed
- Key challenges for seed companies include: limited financing, lack of technical know-how, inadequate breeder/foundation seed, low seed quality, limited infrastructure (e.g., roads, storage, transport), price variability, weak regulatory bodies, and unfavorable seed policies

Ugandan Seed Market
- Formal seed market: agro-dealers (5%), direct from manufacturer (2%), govt (2%), NGOs (2%)
- Informal seed market: farmers saving seed for own use (41%), farmers exchanging seed with neighbors (13%), and farmers growing seed for sale through informal channels (35%)
- Informal markets continue to dominate due to:
  - Supply shortages and inadequate access to appropriate seed markets
  - Limited financial resources (less than 20% of farmers obtain credit to purchase seeds)
  - Lack of awareness of improved varieties

Common Crops by Region
- Western Region: Maize, coffee, rice, sweet potato
- Central Region: Maize, coffee, beans, cassava, sweet potato
- Eastern Region: Maize, rice, coffee, groundnuts, cassava, sweet potato
- Northern Region: Maize, sesame, beans, rice, millet, groundnuts, sorghum

Market Breakdown, by Crop
- Maize: 44% formal, 20% informal
- Sesame: 10% formal, 90% informal
- Sorghum: 7% formal, 93% informal
- Sunflower: 7% formal, 93% informal
- Rice: 5% formal, 95% informal
- Millet: 3% formal, 97% informal
- Groundnuts: 1% formal, 99% informal
- Beans: 1% formal, 99% informal

Source: (1) Joughin, 2014; (2) USAID LEAD, 2011; (3) UBOS, 2013; (4) ISSD Uganda, 2014; (5) PELUM, MISEREOR, 2012
Uganda’s seed market is dominated by maize seeds, 60% of which are hybrid varieties

Formal Maize Seed Market in Uganda

- OPVs: 40%
- Local Hybrid: 45%
- Foreign Hybrid: 15%

% Breakdown of Formal Maize Seed Market

Maize Production

- Maize production supports 3M Ugandan farm households
- Uganda is the largest maize exporter within East Africa and export earnings are ~38 – 45M USD
- Maize covers 1.5 M hectares of land; however, low soil fertility, lack of improved varieties, and erratic rainfall contribute to low average yields of 1.5 MT / hectare
- There are over 31 maize seed varieties officially approved for commercialization, the most of any crop
- Recently, the National Variety Release Committee has approved the release of several drought-tolerant maize hybrids called DroughtTEGO for multiplication (UH 5354, 5355 and WE 2114, 2115, 2101, 2103, 2104, 2106)

Maize Seed Packaging

- Maize seed sold to smallholders is typically sold in 1 kg and 2 kg bags, packaged by the seed company
- Many companies are trying to innovate their packaging to combat counterfeiting

Leading Brands in the Hybrid Maize Sector

- A few of the largest seed companies in Uganda include: Fica, East African Seed and NASECO. All these companies control quality and brand through their own production plots and packaging of their seeds
- Brands influence purchase behavior as seed companies have well-known reputation
- Popular hybrid maize seed varieties include: Longe 9H, 10H and 11H, PAN 67, KH500 - 43A

Source: (1) MAFAP, 2012; (2) FSNWG, 2014; (3) AGRA, 2010; (4) AATF, 2014; Joughin, 2014; Expert interviews; Monitor Deloitte field research
The regulatory environment in Uganda is evolving; however, implementation and enforcement is relatively poor due to significant resource limitations.

### Key Players

| **Parliamentary Committee on Agriculture** | Mandated to review and approve sector policies and strategies |
| **National Seed Certification Services (NSCS)** | Mandated to regulate quality assurance, monitor and enforce regulations including licensing of seed dealers, field crop inspection, sampling and laboratory testing, official certification, and the sealing of seed bags |
| **National Agricultural Research Organization (NARO)** | Responsible for the production of breeder and foundation/parent seed (main source of new crop varieties); coordinates public agriculture research and development |
| **National Agriculture Advisory Services (NAADS)** | Aims to empower farmers to access and utilize advisory services provided through extension network of contracted government workers |

### Relevant Seed Regulations

- **Seed Act and Plant Act of 1996**: Requires all new varieties to be tested for two seasons before release and for all seed offered for sale to be properly labelled and sealed.
- **Seeds and Plant Act Regulations – Draft (2011)**: Regulatory framework to outline how seeds should be regulated (including certification, storage, multiplication, and testing).
- **Plant Variety Protection Bill (2011)**: Suggested policy to grant plant breeders’ the rights to provide high quality seeds and planting materials to farmers – once enacted, it will spur investment in the seed sector.

### Steps to License Seed Product and Company

1. **Step 1**
   - Importer or manufacturer of seeds
   - Register product & company with NSCS

2. **Step 2**
   - NSCS evaluated seed variety through genetic testing

3. **Step 3**
   - Agriculture inspectors conduct field inspections

4. **Step 4**
   - If seed lot approved, seed company can begin harvesting, storing, etc.

5. **Step 5**
   - NSCS re-tests product to ensure quality before packaging

6. **Step 6**
   - NSCS provides official Ministry of Agriculture label and approves seeds for sale

*Entire process takes approximately 6 months to complete for a cost of ~US$250*
Our initial interviews and market assessments have surfaced a number of potential barriers that will need to be overcome in order for a coin-scratch solution to be effectively implemented

<table>
<thead>
<tr>
<th>Potential Barrier to Implement Solution</th>
<th>Leverage Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cost Burden</td>
<td><strong>Description:</strong> Develop a program design that alleviates the short-term cost burden, and covers the start-up expenses and design of the long-term, self-sustainable program.</td>
</tr>
<tr>
<td>Profit per unit is significantly lower in seeds than in pharmaceuticals, thus posing a potential cost burden on seed companies wanting to adopt the solution but unable to justify the economics (average retail price for 1 kg of maize ranges between 1-3 USD).</td>
<td></td>
</tr>
<tr>
<td>2 Regulatory Systems</td>
<td><strong>Description:</strong> Work with a CSVT provider that integrates with regulatory systems; automate the processes and technology of the regulators using a short-term third-party quality assurance partner to free-up resources for additional testing.</td>
</tr>
<tr>
<td>Regulatory systems are understaffed, lack adequate funding, and leverage manual processes. As a result, manufacturers are sometimes involved in counterfeiting activities (i.e. sub-standard seed). Validating the source is ineffective if the source is part of the problem.</td>
<td></td>
</tr>
<tr>
<td>3 Multiple Platforms</td>
<td><strong>Description:</strong> Ensure that large percentage of the market is participating in the solution initially, so remaining market is incentivized to participate as well; ensure only one platform (both program and short-code) is used across country.</td>
</tr>
<tr>
<td>It will be important to have all seed companies on a common platform (i.e. same short code) to ensure that producers of counterfeits don’t leverage comparable coin scratch services, and also to maximize adoption by smallholder farmers (become the “911” of counterfeits).</td>
<td></td>
</tr>
<tr>
<td>4 Significant Intermediation</td>
<td><strong>Description:</strong> Need to ensure there are “gated authentications” so that each time the product changes hands or is sold, it is validated / authenticated.</td>
</tr>
<tr>
<td>There is a significant degree of intermediation in seed sectors in East Africa (product may be sold 3-4 times before reaching the end customer); as a result, it is difficult to identify the actual source of the counterfeit product if the end user is only validating the source.</td>
<td></td>
</tr>
</tbody>
</table>
Based on initial market assessments, seed companies will need to meet a number of criteria in order to be optimal stakeholders in a coin-scratch solution

### Potential Criteria for Selecting SSA Seed Companies to Participate in Solution

- **Not part of the problem** – No evidence of packaging or distributing sub-standard, diluted, or fake seeds; seed companies will need to be registered and certified, and undergo regular testing of its products.

- **Something to lose** – Ideal companies participating in the solution will have a strong brand in the marketplace (branded products are often the target of “me too” brands); companies will be willing to pay only if they’ve experienced losses as a result of counterfeits.

- **Financial strength** – Seed companies that have a strong position in the market, high profit margins, and evidence of revenue / profit growth will be more likely to sustain the solution over the long-term.

- **Industry collaborator** – The solution will be most effective if all stakeholders join a common platform / program; seed companies will need to collaborative and not view the program as a means to drive competitive advantage.

- **Industry leader / first mover** – Because the solution is most effective if all seed companies join the program, optimal seed companies will be those that are first-movers and market leaders, so that others follow their lead.
# Table of Contents

- Initial Seed Sector Assessments & Hypotheses
- **Insights from In-Country Research & Interviews**
- Recommended Path Forward
- Appendix: Reference Reports
In our previous work, we assessed six solutions and identified coin scratch & mobile authentication as the most viable solution for tackling counterfeiting.

<table>
<thead>
<tr>
<th>Solution</th>
<th>Description</th>
<th>Assessment of Viability</th>
</tr>
</thead>
</table>
| **COIN SCRATCH & MOBILE AUTHENTICATION** | • End consumers verify the product was produced by a credible, certified manufacturer  
• Enables source authentication; eliminates bottle/label reuse | Very Effective          |
| **BARCODE APPLICATIONS**              | • Unique product information encoded on barcodes that are scanned at each step of the value chain | Very Effective          |
| **MOBILE TESTING KITS**               | • Product is tested for quality at each stage of value chain by an external evaluator; agro dealers are independently certified to distribute agricultural inputs | Very Effective          |
| **INFORMATION DISSEMINATION PLATFORM**| • Farmer reports counterfeiting to hotline; data aggregated and reported to subscribers periodically  
• Enables farmers to learn from each other – network effects | Very Effective          |
| **INVENTORY MANAGEMENT PLATFORM**     | • Agro dealers assess inventory and notify manufacturers of stock levels through mobile application  
• Primarily addresses root cause of counterfeiting: stock-outs | Very Effective          |
| **RFID TAGS**                         | • Radio Frequency Identification (RFID) tag is affixed to product, crate, or pallet; RFID reader uses radio waves to wirelessly scan tag when product comes within close proximity | Very Effective          |

- **Effectively Addresses Causes of Counterfeiting** – Effectively addresses counterfeiting when package integrity is maintained
- **Cost Effective** – Least costly solution to implement and operate
- **Delivers Improved Efficiency to Delivery Channels** – Data captured from mobile authentication process enables the manufacturer to better track inventory movement, thus informing demand forecasts and supply chain management systems
- **Leverages Innovative Technology** – Offers an innovative approach to sales data collection; captures market data on purchasing locations, product types sold, and brands preferences, which can be harnessed to adapt and customize sales strategies
- **Limits Process Changes** – Leverages existing technologies (e.g., SMS, coin-scratch labels similar to scratch-off vouchers to load airtime) that farmers/agro dealers are familiar with
There are a number of considerations that must be assessed for the coin scratch verification program to be sustainable over the long-term.

### Considerations for Coin Scratch Program

<table>
<thead>
<tr>
<th>Category</th>
<th>Key Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addressable Market Size</strong></td>
<td>Are the seed sectors large enough to represent an attractive business opportunity? Are there enough seed companies? How many packages do they move per annum?</td>
</tr>
<tr>
<td><strong>Quality Assurance</strong></td>
<td>Are there quality assurance processes in place such that the seed companies’ labels accurately represent the quality (purity, germination, etc.) of the product in the package?</td>
</tr>
<tr>
<td><strong>Willingness to Address Issue</strong></td>
<td>Is the problem of counterfeiting prevalent across the industry? Are seed companies interested in collaborating to address the issue at scale?</td>
</tr>
<tr>
<td><strong>Technology Environment</strong></td>
<td>Is there regulatory support such that I can I get telecom companies to provide common short-codes that work across markets?</td>
</tr>
<tr>
<td><strong>Willingness to Pay</strong></td>
<td>Could the addressable market be monetized? Are companies willing to pay for the solution? How much will they pay short-term vs. long-term?</td>
</tr>
<tr>
<td><strong>Adoption of Solution</strong></td>
<td>What costs will need to be incurred in order for the key actors (agro-dealers, smallholder farmers) to adopt the technology? Who will bear these costs?</td>
</tr>
</tbody>
</table>

A CSVT provider would enter and stay in this new market if an attractive opportunity exists; development organizations can help to address potential start-up constraints and catalyze this opportunity.
Addressable Market Size

The market size for a CSVT solution for maize seed is nearly 10 million packages in Uganda and Tanzania with additional opportunity if expanded to other crop varieties or into other African markets.

Market Size by Number of Packages
(Calculated Based on Common Package Sizes for Each Crop)

- Maize dominates most formal seed markets and experiences frequent counterfeiting, making it a logical place to pilot the CSVT solution.
- Expanding the CSVT program into Kenya or other African markets more than doubles the opportunity for a CSVT Operator.

Methodology
- Identified certified crop volumes and the average % breakdown of sales by package size for important crops by country.
- Calculated number of unique packages for each crop by country.

Source: AGRA-PASS reports (2010); CIMMYT (2011); World Bank (2010-2014); ISSD Synthesis Report Tanzania (2014); IFPRI (2008-2011); ESE (2010); AFSTA (2010); WASA (2010)
Willingness to Address Issue (1 of 2)

The majority of seed companies interviewed cited counterfeiting as a significant problem; while many companies have tried various low-tech solutions to address this issue, most have faced limitations . . .

Significance of Counterfeiting

Counterfeiting continues to be a significant issue for the majority of seed companies in East Africa

<table>
<thead>
<tr>
<th>% of Companies Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant</td>
</tr>
<tr>
<td>Neutral</td>
</tr>
<tr>
<td>Insignificant</td>
</tr>
</tbody>
</table>

“Counterfeiting is a major challenge; it’s quite lucrative and the penalties are very low”

“Counterfeit is a serious problem in Tanzania...we not only lose money from losing market share, but the damage done to our brands is irreparable.”

“Fake seeds put our brand’s reputation at risk. Farmers won’t buy from us again and they tell others, which creates a big impact.”

Source: Seed company interviews

Examples of Existing Anti-Counterfeiting Efforts

- **Initiative:** Multinational seed company is adding holograms to its vegetable seed labels
  - **Limitations:** Holograms can also easily be replicated

- **Initiative:** Seed company invested in new packaging materials to make it more difficult to imitate and also reduced the number of packaging material suppliers
  - **Limitations:** New packages have also been counterfeited

- **Initiative:** One seed company changes the package color every season
  - **Limitations:** Consumers cannot distinguish this season’s vs. last season’s packaging, and therefore cannot identify real vs. counterfeit product

- **Initiative:** Seed company established a distribution closer to its end consumer
  - **Limitations:** Increases operational costs and requires additional human resources

Initiative: Multinational seed company is adding holograms to its vegetable seed labels
Limitations: Holograms can also easily be replicated

Initiative: Seed company invested in new packaging materials to make it more difficult to imitate and also reduced the number of packaging material suppliers
Limitations: New packages have also been counterfeited

Initiative: One seed company changes the package color every season
Limitations: Consumers cannot distinguish this season’s vs. last season’s packaging, and therefore cannot identify real vs. counterfeit product

Initiative: Seed company established a distribution closer to its end consumer
Limitations: Increases operational costs and requires additional human resources
Willingness to Address Issue (2 of 2)

Therefore, seed companies are very interested in participating in a coin scratch solution to address counterfeiting.

Interest in a CSVT Solution

The majority of seed companies interviewed are interested in participating in a CSVT solution to address counterfeiting, especially for maize seed:

- Maize dominates the formal seed market and is the primary target for counterfeiting.
- Large government tenders for maize based on poor projections and inadequate foundation seed supply drive counterfeiting.

Examples include:
- Reused / stolen packages filled with grain and labeled hybrid (majority)
- Bulk breaking large packages and “topping” up with grain
- Seed companies / outgrowers mixing hybrid with OPV or grain (substandard or expired products)

Several seed companies were not interested in a CSVT solution due to:

- **Operational costs and constraints**: “We already operate at max capacity; I can’t imagine trying to stick a label on every pack”
- **Counterfeiting from certified seed companies**: “We should have an independent audit of seed companies first for quality assurance purposes”
- **Desire for free market**: “The Govt. needs to give the industry ‘the freedom to operate’ rather than pushing it backwards by introducing new controls and procedures”

Of the 25 seed companies interviewed

Source: Seed company interviews
Willingness to Pay

The addressable market could be monetized as companies are willing to pay for the coin scratch labels given the margins earned on OPV and hybrid maize

Willingness to Pay (WTP) (% of Seed Companies Interviewed)

Not Willing to Pay

- 13%

1-2 cents

- 33%

3-4 cents

- 29%

5+ cents

- 25%

The median willingness to pay is 3 cents

“If I know I’m protecting the quality and company’s reputation, then I would pay 150 UGX on a 2kg bag.”

“Cost is an issue because it’s not just the cost of the label, it’s also a cost to change the packaging and operational process”

“The cost should be reasonable so that we don’t give more room to the counterfeiters to sell even more of their cheap products.”

Average Margin per 2kg of Maize (USD) (Estimate)

<table>
<thead>
<tr>
<th>MAIZE</th>
<th>Uganda</th>
<th>Tanzania</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hybrid</td>
<td>OPV</td>
</tr>
<tr>
<td>Revenue</td>
<td>3.36</td>
<td>1.49</td>
</tr>
<tr>
<td>Cost of Sales</td>
<td>2.69</td>
<td>1.04</td>
</tr>
<tr>
<td>Gross Margin¹</td>
<td>0.67 (20%)</td>
<td>0.45 (30%)</td>
</tr>
<tr>
<td>VAT²</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>Cost of Certification Labels³</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>Net Income</td>
<td>0.49 (15%)</td>
<td>0.31 (21%)</td>
</tr>
<tr>
<td>Cost of CSVT labels</td>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>Profit</td>
<td>0.46 (7%)</td>
<td>0.28 (11%)</td>
</tr>
</tbody>
</table>

1) Average gross margin estimates provided through expert interviews
2) There is a 18% VAT tax on agro-inputs in Uganda (as of July 2014); this tax has been widely unpopular and there is significant pressure to remove it
3) Blue certification labels are mandated by the Ugandan government for all maize seed; these labels certify the product and provide production information (e.g., variety, lot #, etc.); Tanzanian government plans to introduce a new, mandated seed package label this year for 300 TZS per label (new cost and operational process to seed companies)

Considering already thin margins, the cost of CSVT labels represents a high percentage of the profitability of seed companies (~4-11%)
Quality Assurance

Certification agencies in Tanzania and Uganda are significantly under-resourced, and therefore expressed strong interest in collaborating on a coin scratch solution to improve the quality of seed sold in formal markets

Seed Certification Challenges

Seed certification processes exist in both countries, but face significant resource limitations resulting in:

- **Inconsistent field inspection** – inspectors may test seed from select lots from a few outgrowers, but often do not reach all seed lots
- **Untimely inspection** – inspectors often are not present at the right time to test germinated seeds and at proper harvest time
- **Lack of retesting** – seeds may be tested in the field, but not before packaging, which allows seed packages to be “topped up” with grain before distribution
- **Inadequate disposal of substandard product** – seed rejected by inspectors is sometimes packaged for distribution

Third-Party Quality Assurance

Third-party certification organizations can play a key role in quality assurance covering the seed value chain. They can support coin scratch implementation by auditing seed companies, certifying seed, and ensuring the distribution of coin scratch labels based on test results (but require accreditation to do so). Many of these organizations have worked previously with other government agencies (e.g., export/import, fisheries) in public-private partnerships (PPPs), but have had limited to no relationship with the seed sector.

Key Lessons Learned

- The current seed industry players require capacity building through training and setting up procedures and systems
- In addition to building human resources, regulatory bodies require support with logistics (e.g., vehicles, equipment), securing accreditation, and funding
- **It is the mandate of the regulatory bodies to conduct quality assurance; efforts should be made to strengthen existing quality assurance and certification processes**

Capacity Building in Existing Regulatory Bodies

Ministry of Agriculture, Animal Industry and Fisheries

Ministry of Agriculture, Food Security, and Cooperatives
Technology Environment

It is possible to establish a common short-code across MNOs in multiple countries (with the right level of government support and financial resources)

**Requirements**

- A common short-code across countries will encourage adoption of solution by regional seed companies
- It will be important to build a brand around one short-code for anti-counterfeiting in East African seed sectors (“911” of anti-counterfeiting) to prevent counterfeiters from leveraging the same technology
- Mobile authentication technology is contingent upon consumer access to basic mobile phones, familiarity with SMS, and reliable mobile network connectivity

**Technological Considerations**

- Kenya’s short codes are 5 digits, and Uganda / Tanzania’s are 4 digits; it’s not impossible to get a common regional code, but requires the right lobbying of and support from telecom regulators
- In some end-user verification pilots, farmers infrequently verified the product due to lack of air-time; sophisticated counterfeiters can take advantage of these users
- Mobile phone coverage may be inconsistent in rural regions

**Process for Setting Up a Regional Short-Code**

- Hire Independent Government Consultant
- Work with telecom regulatory body in each country to request short-code
- Expedite process with support and lobbying of government
- Work with MNOs to ensure the availability of a common short-code – iterative process
- Once short-code identified, telecom regulatory body provides approval for operational use
- Develop marketing campaign to educate farmers about CSVT solution and short-code for anti-counterfeiting

**Cost:** $25,000 - $50,000 (USD)
**Time:** 2-6 months
Adoption of Solution

Market education initiatives, targeted incentives, and local partnerships are critical for both encouraging adoption and ensuring appropriate use of the technology.

Critical Factors to Drive Adoption

1. **Education and Promotion**
   - Farmers will need to be aware of this anti-counterfeiting initiative and its benefits – this can be accomplished through radio programs, marketing materials, and smallholder trainings.
   - Farmers also need to be trained on how to properly identify counterfeit agricultural inputs.
   - Pictorial-based instructions coupled with training on distinguishing between types of SMS replies may be necessary to ensure technology usage and adoption.

2. **Targeted Incentives**
   - In end-user verification pilots, although market share of genuine products increased, farmers infrequently verified the product via SMS (7% authentication rate); savvy counterfeiters can take advantage of these users.
   - Therefore, targeted incentives are also key: authentication rates are expected to be quite low without incentives; these rates tend to increase significantly when bonuses (e.g., free airtime with text verification, raffle drawing for a motorcycle) are tied to the service.

3. **Local Partnerships**
   - Given that the benefits of the solution are shared, seed companies will need to work together to educate farmers and raise quality assurance standards of the seed sector.

In order to effectively drive adoption, and achieve high authentication rates, significant investments will need to be made – estimates range from $350-600K annually for Tanzania and Uganda.
An assessment of each success factor in the target markets surfaced three areas that need support in order for coin scratch to be a viable solution

<table>
<thead>
<tr>
<th>Addressable Market Size</th>
<th>The total number of maize packages sold in Uganda and Tanzania represents nearly 10 million unique labels.</th>
<th>A large portion of the market will need to participate to ensure that the CSVT provider will enter the market.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willingness to Address Issue</td>
<td>Companies view counterfeiting to be a significant problem and are very interested in participating in a solution that addresses counterfeiting within seed sectors.</td>
<td>Seed companies may need the right catalyst to bring them together to launch the solution.</td>
</tr>
<tr>
<td>Willingness to Pay</td>
<td>Seed companies are WTP about $0.03 per label; however other costs included (advertising, set-up fee, call center, etc.) would raise the cost to seed companies significantly.</td>
<td>The business case of participating in the program will need to be clear; furthermore, there may need to be an initial subsidy to lower the initial cost of participating (non-label costs).</td>
</tr>
<tr>
<td>Quality Assurance</td>
<td>Seed labels do not always reflect the product in the package (purity, germination, etc.); furthermore, there may be topping-up of government / NGO purchases with grains in order to fulfill the order.</td>
<td>Some seed companies won’t participate unless all seed companies are independently audited; the solution will not be effective if the source is authenticated, but the quality is not assured.</td>
</tr>
<tr>
<td>Technology Environment</td>
<td>Telecom companies can provide short-codes that are applicable across countries / regions, but can be a slow, cumbersome, and costly process.</td>
<td>The government will be a key resource in establishing a regional short-code.</td>
</tr>
<tr>
<td>Adoption of Solution</td>
<td>Smallholder farmers are familiar with coin-scratch labels and use mobile devices, but evidence suggests they won’t authenticate without the appropriate level of education / incentives to do so.</td>
<td>Significant efforts / costs will be incurred to appropriately educate agro-dealers / farmers. Authentication will enable capturing data that will be valuable to seed companies over the long-term.</td>
</tr>
</tbody>
</table>

= Favorable  = Neutral  = Unfavorable
Table of Contents

• Initial Seed Sector Assessments & Hypotheses
• Insights from In-Country Research & Interviews
• **Recommended Path Forward**
• Appendix: Reference Reports
Coin scratch provides an effective mechanism to verify the source; but, it is limited in its ability to verify the quality of the product sold by the source.

Counterfeiting in the Seed Value Chain

**Seed Source**
- Seed Companies
- Unlicensed Seed Companies

**Distributors**
- NGOs/MNOS
- Government
- Agro Dealers / Stockists
- Mobile Salesmen

**End-Consumers**
- Smallholder Farmers

1. **Stolen / Reused Packages**
   - Agro dealers, unlicensed seed companies, and other distributors acquire and re-use bags of reputable seed companies and refill them with grain, and/or fake seeds (including expired seeds)

2. **“Me-Too” Products**
   - Unlicensed seed producers create and distribute “me-too” brands that leverage similar branding/packaging and confuse smallholder farmers
   - Imitation packages of leading seed companies are imported from overseas and filled with grain and/or fake seeds; traders create fake hybrid seeds by dyeing locally produced grains before repackaging them

3. **Package Imitation**
   - The quality (purity, germination, etc.) of the seed is not accurately reflected on the seed package due to inadequate inspection (e.g., hybrid label on OPV, inaccurately reported purity and germination rates)

4. **Mislabeled Seed**
   - Grains or OPVs are added to packages to “top-up” orders when they supply is constrained and contracted amount cannot be met with genuine seed

5. **Diluted Seed**
   - Improper disposal or recall of expired seed – expired seed is instead packaged or mixed with other quality-certified product

*Package integrity is a critical factor for this solution to be successful; bulk breaking is another type of counterfeiting (although less prevalent) that occurs at various stages throughout the supply chain, but is not addressed by coin scratch or quality assurance.

Coin scratch addresses types of counterfeiting in which the end consumer cannot verify the source . . .

. . . but it does not address types of counterfeiting when the source is part of the problem; in these instances, quality assurance is required to enable the coin scratch solution
Therefore, in order to holistically and effectively address counterfeiting, improving quality assurance processes is a critical prerequisite to a coin scratch solution.

Two Complementary Anti-Counterfeiting Interventions

**IMPROVED QUALITY ASSURANCE**

- Improving quality assurance is a critical first step to “clean-up” the sector and ensure that seed package labels accurately reflect the contents.
- A quality assurance intervention provides a temporary solution while the seed sector develops self-regulation capacity and moves towards accreditation.
- **Limitation:** While a quality assurance intervention addresses the problem of substandard seed, it does not address counterfeiting caused by package reuse and adulteration.

**COIN SCRATCH & MOBILE AUTHENTICATION**

- Coin scratch enables end consumers to verify that the product was produced by a credible, certified manufacturer, thereby preventing package reuse and adulteration.
- This technology also gives seed manufacturers better visibility into their supply chains, allowing them to track inventory beyond the first set of agro-dealers.
- **Limitation:** Coin scratch only validates the source but not the contents of the bag; strong quality assurance processes must be in place for coin scratch to be an effective solution to tackle counterfeiting.

When implemented together, smallholder farmers can ensure that they purchased seed from an authenticated source, and that the source produces quality seed.

Note: This holistic solution addresses counterfeiting as long as seed is packaged and package integrity is maintained; it would not address counterfeiting if seed is not packaged, but rather sold out of bins / trucks in small quantities.
Seed sector professionalization through improved quality assurance that moves toward accreditation combined with coin scratch will effectively address the majority of counterfeit seeds.

**In the short-term, quality assurance could help...**

- Existing regulatory bodies have the mandate for quality assurance, but insufficient resources to do it effectively.
- Therefore, government can work with third-party quality assurance organizations to audit seed companies and assess seed quality during production, processing, and distribution:
  1. Seed field inspection to assess quality of production
  2. Random testing of seed at factory to assess post-harvest handling and processing
  3. Random sampling of packages at registered agro dealers to ensure labels accurately reflect seed quality

**...but in the long-term, the industry will need to move towards accreditation**

- Accreditation allows seed companies, who pass specific criteria and examinations, to undertake quality assurance responsibilities under government supervision.
- Accreditation is the industry standard in the US and Europe and has been implemented successfully in Zambia and South Africa.

**Case Study: Zambia**

- Since 1997, Zambia’s Seed Control and Certification Institute (SCCI) has invested in building private sector capacity for seed certification through yearly training programs on seed quality management; trainings are followed by practical examinations that if passed certify the organization’s qualifications to conduct official seed inspection activities.
- Several seed companies now have staff members who can now certify seed through an accreditation process, which has substantially lowered the burdens on government, increased the speed and efficiency of the seed certification process, and contributed to the growth of the formal seed sector.
- SCCI, with donor and private sector support, has also invested in 7 regionally located seed service centers which can assist seed companies to build the capacity necessary for accreditation.

**Accreditation – or a sector that is self-regulated – will adequately address the problem of sub-standard seed distributed, produced, and sold**

Source: ISSD, 2013
The first phase of an anti-counterfeiting initiative would focus on quality assurance and preparing the industry for accreditation.

**Program Rollout and Structure**

**Phase 1: Quality Assurance**

- **Prepare Sector for Accreditation Program**
  - Government and Project Manager work together to:
    - Develop protocols / processes for an accreditation program
    - Develop training materials
    - Identify requirements for third-party quality assurance
    - Validate protocols and 3rd party QA requirements with seed companies; iterate as needed
    - Identify and enroll seed companies in program

- **Provide Third-Party Quality Assurance**
  - Participating seed companies undergo accreditation training as well as obtain additional resources (e.g., staff, equipment) necessary for self-regulation
  - Project manager supports seed company incorporation of quality assurance into existing processes
  - While seed companies build capacity, third-party quality assurance conducts randomized sampling on packaged seed to test seed quality post-distribution

- **Build Capacity of Seed Companies**

- **Accreditation and Ongoing Regulation**
  - Accredited seed companies self-regulate and conduct their own quality assurance testing
  - Government regulatory agencies perform randomized testing to ensure that quality standards are upheld and to maintain accreditation
  - After 1 year of accreditation, government and program manager assess program, identify key challenges, and revisit protocols to update as needed

**Phase 2: Coin Scratch & Mobile Authentication**

**Phase 3: Broad Industry Adoption**

**Transition from Third-Party QA to Accreditation**
Once quality assurance and accreditation processes have been developed, the program should focus on coin scratch and increasing industry adoption

Program Rollout and Structure

Phase 1: Quality Assurance

Phase 2: Coin Scratch & Mobile Authentication
- Once a company passes the third-party quality assurance tests, they work with the coin scratch provider to estimate how many coin scratch labels they will need for the next planting season
- Coin scratch providers verify with government regulators the number of labels to be distributed to each approved seed company (e.g., the number of coin scratch labels should not exceed the number of the regulator’s mandated labels provided to any seed company)
- Seed companies work with agrodealers and distribution chain actors to drive adoption
- Seed companies track distribution of product through verified labels

Phase 3: Broad Industry Adoption
- As the market matures, seed companies who want to build capacity for accreditation and are interested in the coin scratch program are identified
- Seed companies complete a formal accreditation program allowing self-regulation and freeing up government regulator capacity
- As the program grows, additional geographies and crop varieties are assessed for greater program rollout

Phase 2
Coin Scratch & Mobile Authentication

Phase 3
Broad Industry Adoption
There are a number of next steps the Foundation will be taking to begin the implementation of the anti-counterfeiting program in East Africa

Next Steps

- Follow-up with seed sector stakeholders (e.g., seed companies, development partners) to gather input on program design and to better understand willingness / interest in participating

- Conduct additional round of research in target markets on quality assurance feasibility, timeline, costs, and key partners

- Begin discussion with regulatory agencies on quality assurance protocols for the program
## Table of Contents

- Initial Seed Sector Assessments & Hypotheses
- Insights from In-Country Research & Interviews
- Recommended Path Forward
- **Appendix: Reference Reports**
Reference Reports

- AATF, “Maize Farmers in Uganda to Benefit from Four New Varieties Tolerant to Moderate Drought Stress,” May 2014
- AGRA-PASS: The Alliance for a Green Revolution in Africa, “Mid-Term Review of the Program for Africa’s Seed Systems - Tanzania,” September 2010
- AGRA-PASS: The Alliance for a Green Revolution in Africa, “Mid-Term Review of the Program for Africa’s Seed Systems - Uganda,” September 2010
- ASARECA: Transforming Agriculture for Improved Livelihoods, commissioned by the Bill and Melinda Gates Foundation, “Tanzania Seed Sector Assessment,” April 2014