

Mobilising the private sector in the fight against counterfeit agro-inputs

A case study of mPedigree in Tanzania

Who we are

The AECF (formerly the "Africa Enterprise Challenge Fund") is a leading African-owned and led development organisation that supports innovative enterprises in the agribusiness and renewable energy sectors with the aim of reducing rural poverty, promoting resilient communities and creating jobs.

AECF has raised over US\$ 400 million to provide catalytic funding and technical advisory support to enterprises that struggle to meet traditional risk-return standards for commercial investors. In just over a decade, we have supported over 375 businesses in 26 countries in Sub-Saharan Africa, impacted more than 30 million lives, created over 27,000 direct jobs, and leveraged US \$771 million in matching funds.

We surface and commercialize new ideas, business models and technologies designed to increase agricultural productivity, improve farmer incomes, expand clean energy access, reduce greenhouse gas emissions and improve resilience to the effects of climate change while also addressing the crosscutting themes of women, youth, and fragility. AECF is committed to working in frontier markets, fragile contexts, and high-risk economies where few mainstream financing institutions dare to go.

In 2021, the AECF launched a refreshed strategy with the objective to build resilience and sustainable incomes for rural and marginalized communities in Africa.

The Tanzania Agribusiness Window (TZAW)

The Tanzania Agribusiness Window is a ten year programme funded by by the Foreign Commission Development Office (FCDO) and the Swedish International Development Cooperation Agency (Sida). The programme has invested in more than 50 agriculture orientated companies in a wide range of value chains. The programme has impacted tens of thousands of rural people, introduced innovative technologies and changed the way in which markets work for the poor.

Our Footprint in Sub-Saharan Africa



1. The challenges of counterfeit agro-inputs in Tanzania

Agriculture is the backbone of Tanzania's economy, and accounts for almost a third of GDP (NAO-URT,2019) and 65% of employment with women constituting 70% of this labour force.

The problem of fake, counterfeit or substandard agroinputs in Tanzania has not been well researched but has been considered substantial by some observers. Anecdotal evidence estimates that 30-40% of agro-inputs (seeds, fertilizers and pesticides) are counterfeit (Marechera, 2016). of which seeds are most highly counterfeited at 46.8% (Shao, 2014:22). Although Feed the Future's (2021) agro-dealers' survey noted that the proportion of agro-supplies that are counterfeit have reduced from 26% (2019) to 15% (2020)¹, challenges still persist. Even with the implementation of the National Agricultural Input Voucher System (NAIVS)² from 2002/3-2015/16, the annual supply of improved seeds certified by the Tanzania Official Seed Certification Institute (TOSCI) in 2017 was only 30,000 tons, of which 75% were maize seeds. This accounts for only 25% of the annual seed demand of 120,000 tons (ASDP II, 2017).

This lack of availability and quality issues affect uptake of quality agro-inputs by small-holder farmers especially with only 44% of households using improved seeds (Mabaya et al., 2017) and the remainder using saved seed from previous harvests.

There are numerous systemic challenges in the seed sector that promote the production of counterfeit seed: weak and inadequate regulatory frameworks, insufficient production of certified seeds as a result of undercapitalized seed producers, poor policy implementation and crowding out of private sector by the public sector. Counterfeit seed in the market also affects seed producers and traders as fake seeds in branded packaging lead to loss of trust. However, farmers-who do not know the difference, bear the brunt, and suffer the consequences of fake seeds-in terms of crop loses, poor yields, and loss of income. Delays by TOSCI in resolving reported cases of counterfeit seeds only compounds the problem for farmers. The most common ways in which seeds are counterfeited include:

purchase of certified seeds which are then mixed with grains (for cereals) or fake seeds, and sold back to the market at lower prices.

> printing seed packages of other seed manufacturers and packing them with fake seeds.

companies that are specifically established to deal in counterfeit seed.

Agricultural technologies and solutions have emerged that provide support services to agricultural value chains. Significant emphasis has however been placed on leveraging ICT for disseminating market information through bulk SMS, broadcast and mass media, and little in agro-inputs regulation using the increasing access to mobile phones technology. Tanzania Communications Regulatory Authority (TCRA, 2021) indicates (see figure 1) that Tanzania has 53M mobile subscribers (>85% of households), 29M internet users, with a mobile Short Message Service (SMS) traffic of 11B per month (as of March, 2021) accounting for at least 2 SMS per mobile subscriber per month.



Figure 1. Mobile subscription and voice penetration in Tanzania (TCRA, 2021)

While seed companies have varied responses to the challenge of fake seeds in the market including: ordering of pre-packaged packets/pouches abroad (China and India) to reduce counterfeit packaging, responding to farmers reports of fake seeds immediately to secure and maintain trust, and by reporting incidents to TOSCI, the mPedigree innovation of using serialized labels as a measure to verify seed authenticity is an approach that has the potential to transform the management of counterfeit agro-inputs through integrating technology in seed quality regulation.

2. How mPedigree addresses the problem of counterfeit seeds

mPedigree is a supply chain logistics and input supply company that provides input verification services to suppliers to counter the challenge of counterfeit/ fake/sub-standard agro-inputs in Tanzania, with special focus on seeds. mPedigree provides input verification services to suppliers to counter the challenge of counterfeit/fake/sub-standard agro-inputs in Tanzania, with special focus on seeds. It interfaces with seed manufacturers at the point of packaging to serialize a 12-digit unique code, that when scratched and texted to an SMS short code-15393, provides the farmer with key product information including: brand details, pack size, lot/batch number and expiry date.

mPedigree started with seeds, it intended to roll out the innovation to other agro-inputs, notably crop protection and agro-chemicals in partnership with regulators including Ministry of Agriculture and Food Security (MAFS), TOSCI, and TCRA.



Figure 2. mPedigree Seed labels donated to TOSCI for pilot purposes

mPedigree's business model anticipated to systematically:



The processes have generated mixed results. The reality of policy, regulatory and business environment has made it impossible to achieve these intentions, and forced the business model to adapt. Figure 3, highlights the key internal and external challenges that has necessitated adaptations by mPedigree.



Unpredictable regulatory policy environment that crowds out private sector

More than 2 year delay in licensing processing and approval of mPedigree SMS shortcode affecting plans

Opportunities for greater return on investment like partnership building, public awareness and promotions of serialization service not aligned to priority human resources of mPedigree Portal data management and use for decision making and business strategy still weak

Low demand by farmers of certified seeds, as 60% still use seeds from the informal seed systems

mPedigree failed bid for national serialization tender, 2020, which would have activated the national traceability and tracking system

Figure 3. Key challenges to mPedigree business

While these adaptations are not radical, they have leveraged on the innovation's capacity to be applied in a wide array of service sectors, to keep the business afloat.

The success of mPedigree's model is predicated on the preconditions that farmers are willing to pay for an external quality assurance and seed producers prefer mPedigree's service.

According to KIT Royal Tropical Institute, 2017 (2)³, three important conditions are necessary for farmers to be willing to pay:

- The additional cost is modest compared to the profits they could obtain from the crop,
- Farmers are convinced that the external quality assurance (EQA) is rigorous, and
- There is clear difference in the yield potential of the quality seed produced and marketed by a seed manufacturer compared to the farmer's own (saved) seed.

While EQA does not cushion seeds from their internal quality, seed manufacturers often indicate on their seed pouches/ packets a warranty clause that is pegged on internal quality that manufacturers can assure of their seed brand (see example in figure 4).



Figure 4. Warranty clause on internal seed quality (EWS)

However, for seed producers and traders, EQA provides 'proof of quality' of their seed to clients, thus safeguarding their brand reputation and integrity.

For seed producers, the choice of mPedigree serialization service is hinged on the following conditions:

- The seed labels are tamper proof, and the SMS short code provides real-time feedback on seed authenticity to (many) farmers/clients.
- The serialization service provides portal data, on which seed varieties are preferred by farmers, for stocking and purposes of demand projection.
- The serialization service helps seed producers understand product revolving days⁴ to ascertain turnover and volumes of seed which may expire before reaching the farmer.
- The portal data enables access to farmers contacts⁵ that can be used for brand promotion and agronomic support services at will-This feature is

currently not interfaced into mPedigree system

3. mPedigree's progress, challenges and lessons

3.1 Product (serial label) sales, use and farmer benefit

The process of acquiring an operational license for the serialization service and SMS short code from TOSCI (under MAFS) and TCRA respectively took over two years (2016-2018). Actual printing and sales of serialized seed labels began in 2019, after engaging with Tanzania Seed Traders Association (TASTA) and informing them of the innovation under endorsement from TOSCI and MAFS. This provided the opportunity for mPedigree to sell its first batch of seed labels to TASTA members, activating mPedigree's portal for commercial use.

Figure 5, illustrates sales of serialized seed labels to: Monsanto⁶, East Africa Seed Ltd, East West Seed Company, Africasia, Pop-Vriend and TOSCI. TOSCI however received 500,000 seed labels [barcodes] for free to pilot with their cereal seeds and certify that they met the quality standards for seed traceability.







Figure 6. Picture of seed variety with mPedigree see labels, SMS code & toll-free number

There is a systematic increase of farmers purchasing seeds from seed traders and verifying quality using the mPedigree solution. Although the increase is marginal, there was an increase of 27% in farmers who buy seed and scratch between 2019-2020, which declined to 16.4% in the period 2020-2021. While this percentage is small, the economic impact of COVID 19 on farmers demand for certified seeds had some contribution. Seed manufacturers indicated that, while figures differ based on seed variety and (planting) seasons, their records show at least 500-700 farmers per seed variety 'scratch' annually. EWS on their part, estimate the increase in farmers using the short code at 30-40%, a result of 'farmers becoming more aware of the importance of using authentic seeds'.

3.2 Navigating the regulatory environment

Tanzania Official Seeds Certification Institute (TOSCI) was established under the Seed Act, 2003, with a role to oversee the seed testing and certification systems in the country. The transition of government engagement in the seed market from TANSEED to TOSCI (under the act), having mandate for doing business on behalf of the government, was heightened by the 5th governments nationalization policy that prioritized government doing business with government agencies, and thus technology approaches to seed (especially cereals) regulation were taken up mostly by Tanzania Telecommunications Corporation (formerly Tanzania Telecommunications Company Ltd-TTCL) in partnership with TOSCI.

Despite TOSCI functions, URT-NAO (2019) and seed market actors have highlighted some key issues in TOSCI's capacity and management of its core functions on quality agricultural inputs to farmers, including:



The above gaps are echoed in ASARECA/KIT (2014), that TOSCI has inadequate capacity to conduct seed inspection, seed testing and labelling. Whereas TOSCI has tried to address the problem of fake seed by placing serialized labels on seed packages weighing more than 2Kgs which contain traceable information on crop type, variety, lot number, % purity, % germination and test date, the stickers (it was observed by seed manufacturers using them) were vulnerable to forgery. Despite this focus on packages above 2kgs, "93% of the seed sold by seed companies were sold in small packages of less than 2 Kgs" (TASAI, 2017). This implies that the TOSCI labelling focus leaves a higher percentage of seeds unregulated. The report thus recommends in part, investigating and piloting opportunities for seed source traceability to fight counterfeit seed, and quality control systems in seed marketing channels.

Despite the conflicted regulatory environment, mPedigree seed serialization service aligns within the MAFS (through TOSCI) requirement that all certified seeds should have labels, and takes it to a level where such labels are traceable and tamper proof-a feat that has not been achieved before in Tanzania. The MAFS and TOSCI both hailed the mPedigree innovation as a great boost to efforts to regulate the challenge of counterfeit seeds in Tanzania, and sought to have a private public partnership to jointly roll-out the technology nationally. mPedigree held technical staff trainings for MAFS and TOSCI on the serialization service and provided 500,000 free seed labels to TOSCI to pilot on cereals in support of a potential national roll-out. However, bureaucracy and conflicted position of government prioritizing business with government agencies contributed to a lengthy process of licensing and approvals from TCRA and TOSCI, which was provided in 2018.

3.3 Facilitating buy-in and partnership mechanisms

The partnerships that exist between mPedigree and seed manufacturers were created through endorsement by TOSCI (MAFS) to TASTA⁷ on one hand, and introduction by AECF to investees engaged in the seed trade on the other. In addition, mPedigree facilitated a workshop in 2018 with 20 seed companies associated with TASTA (and TASTA itself) to introduce the innovation and demonstrate its potential benefits in managing the challenge of counterfeit seeds. This led to serve seed manufacturers taking up the mPedigree serialization service.

While a successful national launch of the serialization service was conducted with support from MAFS and seed stakeholders in Arusha in 2019, it was realized that more impetus was needed to jointly expand awareness with private and public agricultural extension personnel and farmer associations- The study however, does not find evidence that this was pursued. mPedigree in their analysis of motivations of partners who take up the innovation, highlighted the profiles as: mostly private sector, with progressive leadership and embrace the opportunity that IT provides in addressing the problem of fake seeds in the seed market and supply chains.

mPedigree has used minimum prices for seed labels to encourage seed manufacturers to adopt the serialization service without increasing seed prices in the market. Certified seeds are expensive, and additional costs that raise seed prices further are detrimental to farmer uptake and affect business margins. Since seed producers sell (mostly horticultural seeds) in small sachets, they largely expect to absorb the serialization service cost instead of passing it on to farmers–although those with high demand premium varieties of hybrid tomatoes and water melons should be able to add the costs.

3.4 Expansion: Scope and scale

The cereals seed market in Tanzania is over-regulated, with public agencies having an upper hand and thus crowd out private sector. Because of this, mPedigree and (private) seed manufacturers have put more effort on vegetables (and horticultural) seeds, as they are high value, in demand and have higher risk of being counterfeited. Although the sale of serial labels for the seed market by mPedigree is low and unlikely to be sustainable in the near term, initiatives to expand the serialization service model to other sectors have been prioritized (see fig 7).

Lubricants	Anti-counterfeit services to Oryx's Excel lubricant, to protect it from counterfeiting and provides 'scratch and win' loyalty partnership programme with BP's Vivo engine lubricants
Cashback Vouchers	In partnership with Coral Paints (Tanzania), investing in 18 cash-back initiatives, whereby the customer gets a voucher which can be cashed back; With Accordion, mpedigree vouchers when scratched gives one a chance to win items under promotion.
Publishers	Provides anti-counterfeiting services for the Oxford Publishers dictionary labels, to replace the initial hologram labels that they used before, and which were prone to counterfeit.
Medicines	mPedigree received a support letter to approach drug manufacturers directly and market the anti- counterfeit innovation. Attempts were made with Shelys Pharmaceutical Tanzania; however, the client claimed the amount was too costly, and have not offered a counter-offer so far.
Verify	Piloting a block chain system to verify authenticity of documents and certificates. This includes verifying COVID 19 certificates for embassies and international conferences, a pilot which is already under way in mpedigree (Kenya) with USAID mission.
Retail Chains	Working with Megatrade (manufacturers and suppliers of K-Vant), by establishing a QR code that allows consumers to verify authenticity of the brand, before drinking.

Figure 7. Alternative sectors where mPedigree has ventured

4. The pre-conditions for market system change have been created but the enabling environment remains challenging

4.1 Market systems change

Although mPedigree has only been in operation in Tanzania for three years (2019-2021), the AECF investment in the serialization service has catalyzed changes in market systems.

i. Opening up partnership opportunities:

Many of the seed manufacturers who are members of TASTA are (or have been in the past) AECF investees. AECF was thus able to introduce mPedigree to its investees in the seed value chain and this, together with the support of TASTA, made it easy for TOSCI to endorse mPedigree. Although mPedigree is not a fully paid-up member of TASTA, the confidence TASTA has on AECF has facilitated and strengthened partnerships around the innovation.

ii. Linking seed manufacturers and farmers:

The feedback message received by farmers after using the verification system, has a toll-free number incase customers have questions. Most people calling have questions on the seeds, not the verification process, and mPedigree transfers these clients to the specific seed manufacturers for support. In this way, mPedigree links farmers (small and large scale) to seed manufacturers, thereby increasing demand for certified and serialized seeds in the market.

iii. Increased competition:

Agrimark uses the same scratch technology as mPedigree, however, an agreed partnership mechanism did not take off. While Agrimark is registered, they have not yet acquired any operating contracts on verification technology in Tanzania. Quincewood is the biggest competitor, and partnered with TTCL and TOSCI to win the TOSCI 2020 serialization tender for cereals. Quincewood uses USSD code SMS technology, but not scratch technology, and their approach is a scan QR code which only works with smartphones- a challenge since most smallholder farmers in Tanzania do not own smartphones. Seed manufacturers dealing in cereals, however complained that TOSCI seed labels are more expensive, forcing them to charge farmers extra to recoup their costs.

Other potential competitors include Traceit and Sproxil. Although the latter is a global competitor to mPedigree, they have closed their operations in Tanzania thus reducing the edge of local competition. Oxford University Press has preferred the scratch technology from mPedigree over the hologram technology they used before. This offers opportunity for mPedigree to initiate discussions with businesses who still use hologram technology, and if this approach succeeds, then providers of that technology may phase out of the market.

iv. Marginal improvements in TOSCI supervision capacity:

Despite the capacity strengthening on seed traceability and free pilot seed-labels provided by to TOSCI by mPedigree, marginal changes have been observed on seed quality supervision. Seed manufacturers indicated that external quality assurance for cereal seeds has improved as a result of the Quincewood/TOSCI/TTCL (2020) partnership on cereals seed, especially on TOSCI inspection of seed quality with seed manufacturers, and counterchecking quality on agro-dealers' shelves to verify with seed manufacturers. No major gains have been observed at the policy front in respect of alternative seed certification nor progress on national seed traceability efforts, as this has not been a political priority.

4.2 Catalyzing an enabling environment

The uptake of certified seeds in Tanzania remains low as most farmers still use seeds from the informal system⁸, are less aware of the benefits of certified and authentic seeds, and rarely have the capacity to verify whether seeds are counterfeit or not. While mPedigree serialization service has shown, albeit at a limited scale, the potential benefits of technology in seed quality regulation, there are mixed results on the extent to which it has catalyzed an enabling environment in Tanzania.

- Policy on seed traceability aborted: Whereas the National Implementation Policy for Seed Traceability was created and mPedigree committed to provide necessary support, the tendency to crowd out the private sector, rolled back any real progress that could have been made.
- Demand for certified seeds is low and seed export will take time to obtain; 60% of small holder farmers use saved seeds, and demand for certified seeds is low. While TOSCI initiated an OECD platform to enable seed manufacturers export seed under mPedigree OECD certified labels, this initiative was premature, since local demand, although low, is not yet met.
- Seed markets are over-regulated, but the challenge of counterfeits persists even in other sectors: While mPedigree has shown the range

5. Conclusion: The technology exists to fight counterfeit seeds; now demand needs to catch up

mPedigree as an investment has introduced a potential technological innovation, that if embraced, can significantly transform the fight against counterfeit seeds. It also has potential for a range of other quality verification uses across Tanzanian industry. However, at the current volumes of seed labels sold, the investment on seed sector alone is neither economical nor sustainable. Three key constraints have been highlighted as contributing to the dismal performance of the business:

- Many farmers still use saved seeds and the demand for certified seeds is low: Coordinated efforts by stakeholders are necessary to focus more attention to public awareness and promotions to catalyze the uptake of certified seeds, with the authentication service to help differentiate between fake and genuine seed.
- Many farmers still use saved seeds and the demand for certified seeds is low: Coordinated efforts by stakeholders are necessary to focus more attention to public awareness and promotions to catalyze the uptake of certified seeds, with the authentication service to help differentiate between fake and genuine seed.
- The unpredictable policy environment, that crowds out the private sector, is devoid of ICT solutions in seed policy regulations, and gives government an 'unfair' competitive advantage.

The above forces mPedigree to diversify serialization services beyond seed, into alternative sectors that do not put them in direct competition with government, but uses the same business model - an alternative that has kept the business afloat.

End notes

¹Feed The Future Tanzania: Mboga na Matunda (FtFT-MnM) Quaterly Report #16,March 2021

- ²NAIVS provided a 50% subsidy through vouchers for the purchase of chemical fertilizers and improved seed to maize and rice farmers
- ³ KIT Working Papers. 2017-2: Effective Quality Assuarace: ISSD Africa Synthesis Paper

⁴ Product revolving days, represents the volumes and number of days that (specific) seedsvarieties take with the traders before they are sold, so as to help seed producers make decisions on stock turnover (demand) and volumes that may expire before they are sold to farmers for recall or replacement purposes. ⁵ This was specifically an ask by East West Seed Company

⁷Ministry iof Agriculture and Food Security (MAFS) estimates that there are 65 certified seed producers in Tanzania, however, currently of the TASTA members, mpedigree works with 11 seed manufacturers thus: Kibo Seeds, POp-Vriend, Monsanto, East West Seed, Africasia, Triachem, Rijk-Zwan, Seed Co, Regina Seeds abd East Africa Seed.

⁶ Partnership with Monsanto, started in 2017 in Kenya, after KEPHIS had approved the innovation, and the sales between 2017 and 2018, were managed from the Nairobi mPedigree office.

References

ASARECA/KIT, 2014: A participatory National Seed Sector Assessment for the Development of an Integrated Seed Sector Development (ISSD) Programme in Tanzania

KIT Working Paper, (2017). Effective Quality Assurance: ISSD Africa Synrhesis Paper (2)

Mabaya, E., Mzee, F., Temu, A., & Mugoya, M. (2017). Tanzania Brief 2017-The African Seed Access Index (TASAI)

Marechera, G. M. (2016). Assessment of Seed Maize Systems and Potential Demand for Climate-Smart Hybrid Maize Seed in Africa. Journal of Agricultural Science, 8(8), 171-181.

Shao, D. &. (2014, July). Combating Fake Agro-Inputs Products in Tanzania using Mobile Phones. International Journal of Computer Applications, 97(No. 17), 21-25.

URT, (2017). Agricultural Sector Development Programme: Phase II (ASDP II): Agricultural Sector for Industrial Development

URT-NAO, (2019, March). Performance Audit Report on Availability and Accessibility of Good Quality Agricultural Inputs (Seeds and Fertlilizers) to Farmers: Report of the Controller and Auditor General of the Republic of Tanzania.

The AECF

West End Towers, Kanjata Road Off Muthangari Drive / Waiyaki Way Nairobi, Kenya

T: +254-111-035-000 | E: info@aecfafrica.org

www.aecfafrica.org