Development of a cassava seed certification system in Tanzania: Evaluation of CGIAR contributions to a policy outcome trajectory

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Views expressed in this report belong to the evaluator and do not necessarily reflect official opinions of the programs commissioning the evaluation.

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Content

Acronyms and abbreviations

5CP	Cassava Varieties and Clean Seed to Combat CBSD and CMD Project
AU	African Union
A4NH	CGIAR research program on Agriculture for Nutrition and Health
BASICS	Building an Economically Sustainable, Integrated Seed System for Cassava in Nigeria Project
BMGF	Bill and Melinda Gates Foundation
CBSD	Cassava Brown Streak Disease
CGIAR	Consultative Group on International Agricultural Research
CMD	Cassava Mosaic Disease
CRP	CGIAR Research Program
CRS	Catholic Relief Services
CIP	International Potato Center
EQ	Evaluation questions
FAO	Food and Agriculture Organization
GLCI	Great Lakes Cassava Initiative
IITA	International Institute for Tropical Agriculture
M&E	Monitoring and Evaluation
MEDA	Mennonite Economic Development Associates
NARO	National Agricultural Research Organization (Uganda)
PASS	Program for Africa's Seed Systems
QDS	Quality Declared Seed
QMP	Quality Management Protocol
RTB	CGIAR research program on Roots, Tubers and Bananas
SRF	Strategy and Results Framework
TARI	Tanzania Agricultural Research Institute
TOSCI	Tanzania Official Seed Certification Institute

Glossary

Champion: Someone who sees value in an outcome trajectory and engages with decision-makers to strengthen it.

Generic (policy) theory of change: A theory of change that describes, from the peer-reviewed literature, in a general sense, how the policy change process works.

Initiative: Coherent sets of activities such as breeding, dissemination, policy engagement and technical support that may or may not be project-related.

Outcome: A change in behavior (practices, relationships) or policies (that influence behavior) of individuals, groups, organizations or institutions.

Outcome evidencing approach: An adaptation of outcome harvesting in which a case for a program is built and challenged as to whether it has contributed to one or more outcome trajectories.

Outcome trajectory: The pattern of interactions and causal links between actors, technologies and institutions that maintain and scale a coherent set of outcomes over time (e.g., the control of purple top disease).

Specified (policy) theory of change: The generic theory of change which is made specific to the instance of policy change being studied.

Executive Summary

Background and context. Since their inception in 2012, the CGIAR research programs (CRPs) on Roots, Tubers and Bananas (RTB) and Agriculture for Nutrition and Health (A4NH) have been generating innovations, testing interventions, and providing science-based evidence and advice to policy and decision makers at local, national and supra-national levels with the expectation that this advice will contribute to policy changes that in turn helps create an enabling environment for agri- food systems innovations. In 2019, the two CRP leadership teams commissioned a systematic assessment to validate four significant policy outcomes to which they had contributed.

This outcome relates to the development of a cassava seed certification system in Tanzania that has led to the passing into law of cassava seed standards for all seed qualities, from pre-basic to Quality Declared Seed (QDS). The development of the cassava seed certification system has been supported by the International Institute for Tropical Agriculture (IITA) with activities included under the RTB framework.

Purpose and scope. The purpose of this case study is to generate evidence and lessons learned on the contributions of CGIAR to stimulate policy changes to create an enabling environment for agri-food systems innovation by pursuing four objectives:

1. To determine and document how and in what ways CGIAR interventions contributed to the development of a cassava seed certification system in Tanzania;
2. To identify other major actions/factors that contributed to the cassava seed certification system trajectory;
3. To generate findings to strengthen CGIAR contributions to the cassava seed certification system trajectory;
4. To contribute to a synthesis document that compares and contrasts the ways in which CGIAR actions have influenced policy in four cases.

Methods for the review. This case study has been carried out as a CRP-commissioned independent evaluation using a version of outcome harvesting called outcome evidencing. Outcome harvesting is 'backward looking' that starts with an achieved outcome and works backwards to identify and understand the outcome trajectory that generated the outcome. Outcome trajectories are understood as the patterns of interactions between people, institutions and technology that contributed to produce the outcome, over time. This approach seeks to identify the contribution made by CGIAR and other stakeholder institutions to the outcome trajectory.

This assessment is made by building a timeline of the outcome trajectory to help specify and test an existing theory – the Policy Window theory of change – that describes how policy changes may have happened. The timeline and theory of change are used to answer the evaluation questions agreed at the start of the evaluation, after first being validated in a virtual workshop by interviewees and other key stakeholders. The draft report then went through two rounds of review to check facts and inferences with stakeholders.

Evaluation questions

The evaluation questions are:

1. How can the Policy Window theory of change be made more specific to the Tanzania cassava seed certification system trajectory?
2. What are the main outcomes resulting from the cassava seed certification system trajectory and how did CGIAR contribute to them?
3. Has CGIAR contributed to integration/consideration of gender in the cassava seed certification system trajectory and, if so, how?
4. Is the cassava seed certification system trajectory likely to be sustained and scaled over the long term?

Findings

Findings relevant to Evaluation Question #1

Finding 1: The threat posed by cassava diseases, in particular cassava mosaic disease (CMD) and cassava brown streak disease (CBSD), is well understood by farmer representatives, NGOs, the private sector and government institutions in Tanzania and the region. CBSD and CMD have been present in Tanzania for at least 85 and 110 years, respectively. Research has been conducted on cassava in Tanzania since 1935. Over the last 25 years both diseases have caused large-scale losses as they have become more virulent. According to IITA documents, CBSD and CMD together cause production losses worth more than USD 1 billion every year in Africa and are a threat to food and income security for more than 30 million farmers.[1] Dealing with the threat is a political priority because cassava is the most important subsistence and food security crop in Tanzania, providing protection against hunger when less drought-tolerant staple crops fail. It is also a burgeoning commercial crop with interest from processors and export demand from countries such as China.

Finding 2: Research on CBSD and CMD has risen in response to serious outbreaks, highlighting the need for good phytosanitary practices combined with making disease-resistant and high-yielding varieties available. Between 2007-2009, three large initiatives worked on cassava seed systems in Tanzania, two supported by BMGF and one by the EU. From this work, and in particular from the Great Lakes Cassava Initiative (GLCI), it became well understood that good phytosanitary practices needed to be underpinned by locally-adapted, implemented and enforced regulations governing quality control. From 2013, TOSCI and TARI, with support from IITA and MEDA and funding from BMGF, developed a cassava seed certification and inspection protocol. Regulations to support the protocol were signed into law in 2017 as amendments to the 2003 Seed Act. As of 2020, quality declared seed (QDS) regulations covering all crops including cassava have been included and gazetted.

Finding 3: While significant progress has been made providing farmers with certified disease-resistant cassava planting material, challenges remain. Currently, 30% of cassava production in Tanzania comes from certified clean seed. Increasing this percentage will require farmers to become more willing to pay for clean planting material, and for seed suppliers to make it available close to their farms to minimize transport costs. In the last eight years, the 5CP project has helped TARI release high-yielding disease-resistant varieties. TARI and TOSCI are working together with IITA and MEDA to develop and test a decentralized network of seed entrepreneurs to meet future needs.

[1] https://www.iita.org/news-item/project-brings-ray-hope-fight-cassava-viruses-africa/ based on Legg et al., (2006)

Finding 4: A long-term close working relationship between IITA/RTB and the Ministry of Agriculture in Tanzania has meant that the development and approval of cassava seed standards has not required overt advocacy. Nevertheless, leaders in TOSCI, TARI, IITA/RTB and MEDA clearly have and continue to champion the trajectory.

Finding 5: The BEST Cassava project is advocating that District Councils use funds allocated to them to support the production, processing and commercialization of cassava. This has involved a project advocacy team training 'champions' at District level. Less emphasis may have been put on advocating for seed certification than warranted because of a prohibition on 'lobbying' for legislation placed by the donor BMGF on its grantees, and a lack of clarity on the difference between 'lobbying' and 'advocating.'

Finding 6: Other capacity development carried out by IITA/RTB and MEDA has played a major part in progress along the seed certification trajectory. This includes building the capacity of TOSCI to diagnose cassava diseases both in the laboratory and by 60 seed inspectors in farmers' fields. It also includes training more than 400 seed entrepreneurs to produce and sell planting material to meet quality standards for basic, certified and quality declared seeds.

Finding 7: The support base for developing and implementing cassava seed certification has been strengthened in three ways.

1. IITA/RTB and MEDA, with BMGF funding, have been pushing for a more market-led cassava value chain so farmers are motivated to purchase clean seed and can pay for it. The government has helped by signing a deal with China to export thousands of tonnes of cassava a year, while the private sector has helped by setting up a cassava plant in Lindi.
2. The BEST Cassava project advocacy team has used the results of scaling work at District level to advocate 'bottom up' that more funds be sought from donors to support the cassava seed system.
3. The MMB and BEST Cassava projects have set up and supported the Cassava Seed Growers' Association to help seed entrepreneurs to coordinate the testing of their fields by TOSCI and to help access credit, both of which make of a more enabling environment for the seed standard trajectory.

Finding 8: The generic policy windows theory of change was made more specific and relevant by identifying and describing what strategies contributed in practice to the model's three main outcomes – shifts in social norms, changes in capacity, and strengthened support base. The main structural change is to recognize that the three main outcomes are linked to each other and form a self-reinforcing loop that drives the outcome trajectory.

Findings relevant to Evaluation Question #2

Finding 9: The main outcome from the cassava seed standards trajectory has been establishment of laws requiring cassava seed standards applied to all seeds, from pre-basic to QDS. IITA/RTB has played a central role in creating, shaping and moving the trajectory forward, helped by strong and consistent working relationships with staff from TOSCI, TARI and MEDA, all of whom played a necessary role without which the trajectory would have been very different, and likely far less successful. The four organizations have formed a de facto coalition funded by the BMGF through a series of projects, beginning with the GLCI in 2009 and set to continue until 2024. IITA/RTB has contributed to the trajectory technically, for example by upgrading TOSCI's testing laboratory and training staff, and through keeping the coalition together.

Findings relevant to Evaluation Question #3

Finding 10: IITA/RTB has not yet contributed to the integration of gender in the cassava seed certification trajectory. MEDA and IITA are planning a gender assessment of the Tanzania cassava seed system and gender targets are being set for new projects.

Findings relevant to Evaluation Question #4

Finding 11: It is likely that the cassava seed certification trajectory will be sustained and scaled over the long term because:

- Of the importance of cassava in Tanzania and the political support this brings, in particular initiatives to stimulate demand for cassava;
- Of shared understanding of the need for a seed system that provides clean planting material;
- Of the strength of a coalition of researchers from TARI, TOSCI, IITA and MEDA that are pushing the trajectory forward;
- Of sustained financial support to the coalition from BMGF that will continue for the next four years;
- The necessary seed standards have been written into law;
- Capacity to implement the seed standards has been built among TOSCI staff, seed inspectors and seed entrepreneurs; and
- The seed entrepreneur business model has been piloted and is working for 400 individuals, supported by an association and SeedTracker to link demand to certified supply of clean seed.

Future success will depend on continuing to simultaneously build the market for cassava, the availability of clean planting material and farmers' willingness to pay for it. Seed entrepreneurs need to be certified, for which a payment method is required that avoids seed entrepreneurs paying seed inspectors directly**.**

Conclusions

Conclusion 1: The Policy Window theory of change has helped understand how IITA/RTB contributed to the seed certification system trajectory. IITA, and later IITA/RTB, has a long history of research on cassava in Tanzania and the region. This has helped frame and clarify the impact of CMD and CBSD and the solution of making available to farmers clean planting material of high-yielding and disease-resistant varieties. IITA/RTB has also contributed to capacity development and creating an enabling environment for a sustainable seed system to take root and flourish. Perhaps IITA/RTB's greatest contribution to the trajectory has been to build and sustain a coalition of key stakeholders beginning in the Great Lakes Cassava Initiative, with strong support from the BMGF, which is set to continue until at least 2024.

Conclusion 2: One objective of the Tanzania seed certification system trajectory has been achieved with seed standards passed onto law. Good progress has also been made in creating a sustainable cassava seed system that meets the standards in building capacity to grow, test and certify clean planting material by seed entrepreneurs and seed inspectors, respectively. Progress has also been made in increasing the market for cassava.

Conclusion 3: At the national level, the coalition helped generate ownership of the trajectory by key individuals from key institutions such that overt advocacy for establishing a cassava seed certification system was not necessary. IITA/RTB is leading an advocacy initiative for a greater market orientation in the cassava value chain that indirectly supports the use of the cassava seed standards.

Conclusion 4: The scaling and sustainability of a market-led cassava value chain depends on farmers' motivation levels and being able to buy planting material that meets cassava seed standards. This depends on a number of factors that need to co-evolve including: increasing the market for cassava; training of, and a payment system for, inspectors; certified seed entrepreneurs aware of the standards and able to meet them; and, farmers sufficiently trusting in the seed system to use it. The co-evolution is happening and will be supported by a second phase of the BEST Cassava project – BASICS II.

Introduction to the case study and broader evaluation

Since their inception in 2012, the CGIAR research programs (CRPs) on Roots, Tubers and Bananas (RTB) and Agriculture for Nutrition and Health (A4NH) have been generating innovations, testing interventions, and providing science-based evidence and advice to policy and decision makers at local, national and supra-national levels with the expectation that this advice will contribute to policy change that in turn helps create an enabling environment for agri-food systems innovation.

CGIAR is a global research partnership for a food secure future dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources. Fifteen research centers are part of this global network and work together towards the achievement of a common Strategy and Results Framework (SRF). The CGIAR works through CGIAR Research Programs (CRPs) and Research Support Platforms. CRPs are led by CGIAR Centers, some of which have been operating for more than 50 years.

This case study is one of four jointly commissioned by RTB and A4NH to understand how the respective program's research has contributed to policy change. The four cases were chosen in a consultation process prior to the start of the evaluation based on the information, documentation and interest of country teams that the case be documented and analyzed. The four cases are on RTB and/or A4NH contributions to four outcome trajectories:

1. Mainstreaming of Biofortification in the African Union: evaluation of CGIAR contributions to a policy outcome trajectory
2. Control of potato purple top in Ecuador: evaluation of CGIAR contributions to a policy outcome trajectory
3. Development of a cassava seed certification system in Tanzania: evaluation of CGIAR contributions to a policy outcome trajectory
4. Development of a cassava seed certification system in Rwanda: evaluation of CGIAR contributions to a policy outcome trajectory

This case study is on the third outcome trajectory – the development of cassava seed certification in Tanzania. The case was chosen by RTB leadership because it represents a significant and on-going policy outcome to which RTB has contributed together with the CGIAR Centre that has and is leading the work -- the International Institute for Tropical Agriculture (IITA). Specifically, the causal claim is that IITA/RTB contributed significantly to the development and approval of cassava seed certification in Tanzania, launched in 2017.

The objectives of this case study are:

1. To determine and document how and in what ways IITA/RTB interventions contributed to the development and approval of a cassava seed certification system in Tanzania;
2. To identify other major actions/factors that contributed to the cassava seed certification system trajectory;
3. To generate findings to strengthen IITA/RTB contribution to the trajectory;
4. To contribute to a synthesis document that compares and contrasts the ways in which CGIAR actions have influenced policy in four cases.

The primary intended users are decision-makers in the CGIAR, particularly respective CRP management units and committees, Flagship Project leaders, Cluster Leaders and Project Leaders and the CGIAR System Organization. Secondary intended users are donors; other CRPs or R4D programs working to improve the enabling environment for agri-food systems and/or wanting to assess/evaluate their role in changing the enabling environment; national partners and stakeholders.

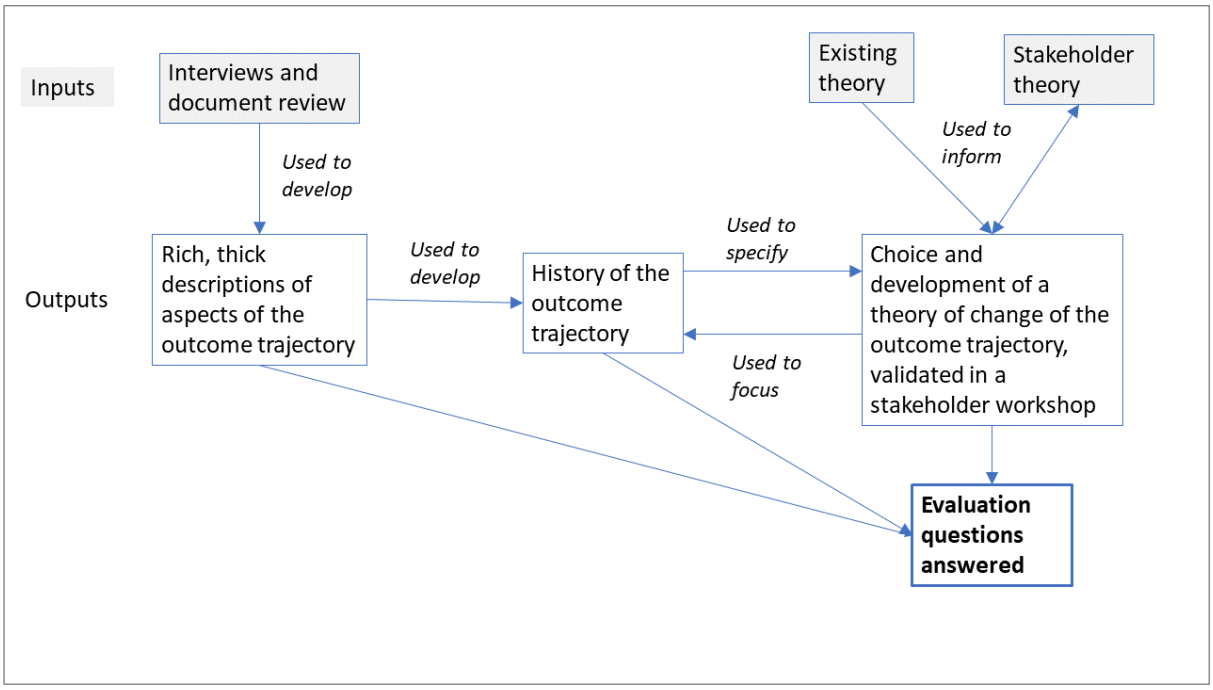
Methodology

This case study and the overall evaluation uses a version of outcome harvesting called outcome evidencing (Paz and Douthwaite, 2017). Outcome harvesting is 'backward looking' in that it starts with an outcome and works backwards to identify and understand the patterns of interactions between people, institutions and technology that contributed to it, over time. This slow-changing pattern is called an 'outcome trajectory.' The approach then seeks to identify the contribution made by the IITA/RTB to the outcome trajectory. In contrast, most program evaluations model how program activity and outputs are contributing to outcomes. They do not acknowledge an outcome trajectory as a mediating mechanism and as a result tend to overemphasize the role of the program and underplay the role of other actors and on-going processes, from local to global level.

The study was carried out between April and October 2020 and followed a series of steps shown in Figure 1. The people interviewed and who participated in a virtual validation workshop are listed in Appendix 2.

Three methods were used to develop the outputs: document review, interviews, and a verification workshop. The people interviewed and who participated in the verification workshop are listed in Appendix 2. The theory of change of the seed certification trajectory is based on a 'formal' theory from the literature selected to be the best fit to participants' understanding of how change happened in the first case study carried out – on biofortification – and then applied to the other three. The theory is used to help focus the development of a timeline of key processes, activities and events that constitute the trajectory. The material the timeline draws upon is the rich, thick descriptions of aspects of the seed certification trajectory captured in interviews, and available documentation. The first evaluation question is how the theory of change is manifest in the historical timeline. The answer is used to make the formal theory of change, which is necessarily generic, specific to the seed certification trajectory. The specified theory of change is then checked with stakeholders in a virtual workshop before being used to help answer the remaining evaluation questions.

Figure 1: Flow diagram of the evaluation approach used



The evaluation questions are:

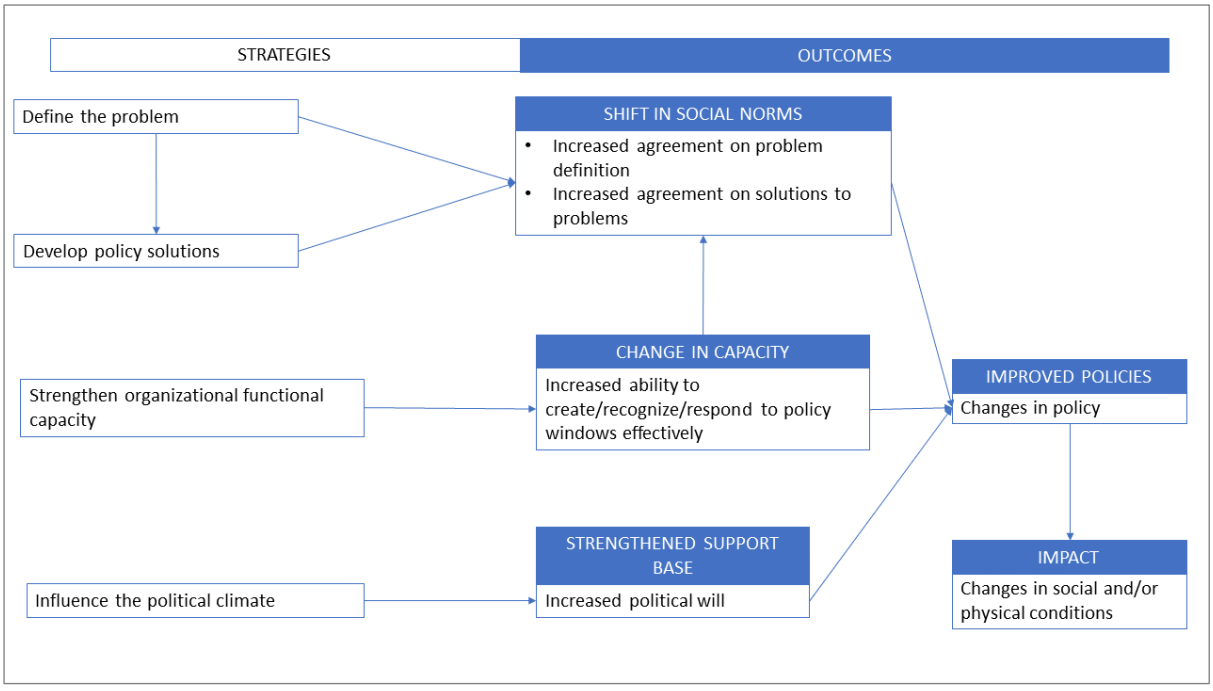
1. How can the chosen generic theory of change be made more specific to the cassava seed certification system trajectory?
2. What are the main outcomes resulting from the cassava seed system certification trajectory and how did the CGIAR contribute to them?
3. Has the CGIAR contributed to integration/consideration of gender in the cassava seed certification system trajectory and how?
4. Is the seed certification trajectory likely to be sustained and scaled over the long term?

The outcome claim that this case study explores is that IITA/RTB contributed significantly to the development of seed certification for cassava in Tanzania.

Description of the generic theory of change chosen

The generic theory of change chosen is the Policy Windows theory that comes from Political Science, developed by Kingdon (1995). The model proposes that policy changes during *windows of opportunity* which help advocates successfully connect two or more components of the policy process. The components are: the way a *problem* is defined; the *policy solution* to the problem; and, the *politics* surrounding the issue (Stachowiak, 2013; Sabatier and Weible, 2007). Windows of opportunity are moments when progress can be made. They can be created by natural events such as pandemics, droughts or earthquakes, for example, the latter is an opportunity to change building regulations. They can be man-made events like spikes in air pollution that lead to changes in clean air regulations. They can also be changes in government, budget cycles or landmark meetings and summits held as part of on-going national, regional and global processes. Policy windows are often short in duration and may be predictable or unpredictable.

Figure 2: Policy window theory chosen as the best fit to describe how policy changes are happening (redrawn from Stachowiak, 2013)



Stachowiak (2013 p. 7) made a number of qualifying statements with respect to the theory of change:

- Often there are many competing ideas on how to address problems. To receive serious consideration, policy solutions need to be seen as technically feasible and consistent with policy maker and public values;
- The way a problem is defined makes a difference as to whether and where the problem is placed on the agenda. Problem definition also has a value or emotional component; values and beliefs guide decisions about which conditions are perceived as problems;
- Advocates can attach their solution to an existing problem that has gained prominence on the agenda, even if that prominence is independent of their efforts;
- To effectively recognize and take advantage of open policy windows, advocates must possess knowledge, time, relationships and good reputations;
- Policy is translated into action plans and implemented.

The main limitation to this evaluation is that COVID-19 has prevented any field visits or face to face interviews – all the interaction with key informants has been virtual. A second limitation is that the resources available to carry out the study have been relatively modest. Thirdly, given that this is a learning-focused evaluation, and the assumption that the change process is complex, the evaluation does not attempt to value contributions made. Systems theory suggests that when outcomes are driven by interactions of people, institutions and knowledge, one is dealing with a non-linear phenomenon for which it is not possible to know the exact worth of one entity's action compared to another. [2] For example, how does one value the expensive actions that brought a system to a tipping point versus the modest action that finally triggered it? Moreover, seeking to attribute outcomes of collective effort to the action of individual organizations can endanger trust and the positive feedback loops required to drive outcome trajectories in the first place.

[2] Axelrod & Cohen, 1999

Findings

The findings come from answering the evaluation questions, as described in the Methodology Section (see Figure 1).

EQ1: How can the chosen generic theory of change be made specific to the cassava seed certification system trajectory?

The generic Policy Window theory of change is made more specific by identifying what strategies identified in the timeline provided in Appendix 1, contributed to the model's three main outcomes. The three main outcomes are:

- *Shift in social norms*, understood as increasing shared agreement between responsible organizations involved in the cassava sector on the severity of the disease threat to cassava production in Tanzania and the necessity for seed certification to help reduce it;
- *Change in capacity*, understood as increased capability among 'champions' to individually and collectively advocate for the design and the implementation of seed certification for cassava. The system including and not being limited to: standards for seed certification; equipped and skilled seed inspectors and seed producers trained on how to test for disease and certify and produce clean seed;
- *Strengthened support base*, understood as more enabling political and financial environment for cassava seed certification to be developed and sustainably implemented.

The three main outcomes together lead to improved policies, understood to be a cassava seed certification developed and sustainably implemented.

EQ1.1 How does the 'shift in social norms' manifest itself in the outcome trajectory?

Finding 1: The threat posed by cassava diseases, in particular cassava mosaic disease (CMD) and cassava brown streak disease (CBSD), is understood by farmer representatives, NGOs, the private sector and government institutions in Tanzania and the region. CBSD and CMD have been present in Tanzania for at least 85 and 110 years respectively. Research has been carried out on cassava in Tanzania since 1935. In the last 25 years both diseases have caused large-scale losses as both diseases became more virulent. According to IITA documents, CBSD and CMD together cause production losses worth more than US$1 billion every year in East and Central Africa and are a threat to food and income security for over 30 million farmers.[3] Dealing with the threat is a political priority because cassava is the most important subsistence and food security crop in Tanzania, providing protection against hunger should less drought tolerant staple crops fail. Cassava is also a burgeoning commercial crop with interest from processors and export demand from countries such as China.

The timeline shows that the main problem that has driven the cassava seed certification trajectory were outbreaks of two viral diseases, cassava mosaic disease (CMD) and cassava brown streak disease (CBSD). Both diseases were first reported in Tanzania: CMD reported in the late nineteenth century[4] and CBSD in 1936. CMD spread throughout the cassava-growing regions of Africa in the 1920s and 1930s.

[3] https://www.iita.org/news-item/project-brings-ray-hope-fight-cassava-viruses-africa/

[4] Warburg (1894) as reported in https://www.cabi.org/isc/datasheet/2535#:~:text=Although%20the%20primary%20host%2C%20cassava,studied%20(Storey%2C%201936%3B%20Storey

In response to CMD, and other cassava diseases, colonial authorities established cassava research programs in a number of African countries from the 1930s, of which one was the Amani Research Centre in Tanzania. After independence, the newly formed governments pursued other priorities and the research programs generally lapsed. The International Institute for Tropical Agriculture (IITA) was established by the Ford and Rockefeller Foundations in 1967 in Ibadan, Nigeria, in particular to support national agricultural research and extension systems. IITA established a cassava research program in 1971, in main part to breed disease-resistant varieties. CMD-resistant hybrids developed at Amani research station between 1935 and 1957 served as a foundation for this work.[5] IITA also worked to encourage the governments of the main cassava producing countries to establish and strengthen their own cassava research programs, in part so as to test and disseminate IITA-bred improved germplasm.

The push to strengthen support to cassava breeding in Uganda received a major boost in the late 1980s with the emergence and rapid spread of a virulent form of CMD. Multiplication of IITA's CMD-resistant varieties (TMS 60142, TMS 30337 and TMS 30572) began in Uganda in 1991.[6]

In 1998, the virulent form of CMD was found in Tanzania. In response, the Tanzanian government approved open quarantine to import CMD-resistant cuttings from Uganda.

From 1936 to 2004, CBSD was restricted to low-altitude areas[7] along coastal East Africa and lakeshore districts of Malawi. From 2004 onwards, CBSD emerged further inland, in areas around Lake Victoria and then spread to many East and Central African countries, causing high yield losses.

Given that cassava is largely grown for home consumption and provides farmers with some security against drought, the disease has become an important threat, in particular to subsistence farmers, in a number of countries including Tanzania.[8]

Finding 2: Research on CBSD and CMD has risen in response to serious outbreaks, highlighting the need for good phytosanitary practices together with making disease resistant and high yielding varieties available. Starting in 2007 to 2009, three large initiatives worked on cassava seed systems in Tanzania, two supported by BMGF and one by the EU. From this work, in particular from the Great Lakes Cassava Initiative (GLCI), it became well understood that good phytosanitary practices need to be underpinned by locally adapted, implemented and enforced regulations governing quality control. From 2013, TOSCI and TARI, with support from IITA and MEDA and funding from BMGF, developed a cassava seed certification and inspection protocol. Regulations to support the protocol were signed into law in 2017 as amendments to the 2003 Seed Act. As of 2020, quality declared seed (QDS) regulations covering all crops including cassava have been included and gazetted.

In the 1990s and 2000s, the number of research papers on CBSD doubled and doubled again from 75 in 1990 to more than 350 in 2010.[9] This reflects an exponential increase in research on the causes and nature of CBSD and other cassava diseases including CMD. This growth was motivated by the severity of outbreaks and the areas affected such that both diseases increasingly became seen as a major threat to food security, particularly for subsistence farmers. Cassava, because of its tolerance to drought, is planted as a famine reserve crop, particularly in Tanzania.

[5] http://www.fao.org/3/a0154e/A0154E02.htm
[6] http://www.fao.org/3/a0154e/A0154E02.htm
[7] <1000 m above sea level (masl)
[8] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5947582/
[9] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5947582/

The research established the importance of both breeding resistant varieties and phytosanitary health to prevent the spread of disease in infected cuttings and roots. It was the increasing realization of the importance of healthy cuttings and the need to control the movement of possibly-infected planting material that provided the main push for the development of a cassava seed certification system.

Early progress towards standards was made in 1997 when IITA and the Ugandan National Agricultural Research Organization (NARO) developed a quality management protocol (QMP) to make sure that cassava planting material distributed to farmers was disease free. This work was carried out as part of a USAID-funded ACDI-VOCA[10] project.

The need to provide cassava farmers with clean planting material of disease resistant varieties continued. In response the Bill and Melinda Gates Foundation funded the Great Lakes Cassava Initiative (GLCI). The Initiative ran from 2007 to 2012 to distribute planting material to 1.15 million farmers in Burundi, DRC, Kenya, Rwanda, Tanzania and Uganda. The project was led by Catholic Relief Services (CRS), with IITA responsible for the disease research component. The project made wide use of the QMP developed ten years earlier. The QMP was the precursor to the cassava seed inspection and certification protocol approved and published by TOSCI in 2017.[11]

BMGF, together with USAID and the Netherlands, funded AGRA to implement the Program for Africa's Seed Systems (PASS), which also began in 2007. PASS' objective was to develop seed systems that delivered new staple crop varieties, including cassava, to smallholder farmers in Africa.[12]

In response to the transboundary threat presented by CBSD and CMD, in 2009 FAO launched the "Regional Cassava Initiative in Support of Vulnerable Smallholders in Central and Eastern Africa" that ran for 5 years to provide clean cassava planting material to 177,000 HH in Burundi, Central African Republic, DRC, Gabon, Rwanda, Tanzania and Uganda. The project was funded by the EU. Like GLCI, the project provided farming households with improved cassava varieties, including IITA-derived varieties in several countries including Burundi, Rwanda, DRC, Uganda and Tanzania.[13] It trained farmer focal points and MoA staff in cassava disease and pest identification; established farmer field schools to train farmers in seed multiplication and building capacities to manage cassava production; and established national cassava coordination committees to regulate the movement of cassava vegetative material. The main difference between it and GLCI was that it worked more closely with government, while GLCI worked more with national and local non-governmental organizations.[14]

Finding 3: While significant progress has been made providing farmers with certified disease-resistant cassava planting material, challenges remain. Currently, 30% of cassava production in Tanzania comes from certified clean seed. Increasing this percentage will require farmers to become more willing to pay for clean planting material, and for seed suppliers to make it available close to their farms to keep transport costs down. In the last eight years, the 5CP project has helped TARI release high-yielding disease-resistant varieties. TARI and TOSCI are working together with IITA and MEDA to develop and test a decentralized network of seed entrepreneurs to meet future need.

[10] ACDI-VOCA is a global development design and delivery partner based in Washington, D.C. The organization has implemented economic and social development projects worldwide in agriculture, economic growth, resilience, finance and equity & inclusion. https://www.acdivoca.org/

[11] https://mel.cgiar.org/uploads/reporting/HzXJoXt3rKxIPkGBvW793djzhm7IhS.pdf

[12] https://tinyurl.com/y6gxpw3u

[13] Respondent 11

[14] Respondent 11

Researchers from IITA and TARI working on GLCI began to increasingly advocate for clean seed systems for cassava leading to BMGF funding three projects to work on the topic after GLCI ended in 2012.[15]

The first project was Cassava Varieties and Clean Seed to Combat CBSD and CMD (5CP) project that had two components responding to the need for both improved and disease-free planting material. The first component was to carry out a 5-country multi-locational trial with five CBSD-resistant varieties from each of the participating countries (Malawi, Mozambique, Kenya, Tanzania and Uganda). With the help of the project, TARI has released six cassava varieties (TARICASS 1 to 6) as of December 2019.

The second component of the project was to build a cassava clean seed system for Tanzania, including a seed inspection and certification protocol. One piece of learning incorporated from the GLCI project was that insisting on planting material being completely disease-free is an unrealistically high expectation. This learning means that when certification guidelines are developed, the starting point is an allowable level of disease of several percent rather than zero. Many countries still officially have zero tolerances in their laws for seed production. This demonstrates they are not using those laws, as if they were, virtually all of their farmers' fields would fail inspection making it impossible for seed to be sold.

The second project, named the MMB project, was led by Mennonite Economic Development Associates (MEDA) to develop commercially sustainable cassava seed systems in Tanzania. This project complemented the second component of the 5CP project by carrying out pilot development of commercial approaches to selling cassava planting material. The social norm that the project was trying to change was that farmers expect to source cassava planting material for free or very cheaply from their own farm, from neighbors or for free from NGOs in the case of crop failure. Farmers are not used to paying for planting material which makes setting up commercial cassava seed enterprises challenging. MEDA implemented the project with TARI and IITA.

The third project on community phytosanitation tested whether it was possible to replace all planting material in a village with clean resistant seed. Technically the experiment was a success, but the approach was expensive and proved to be logistically and socially difficult to implement. BMGF decided not to scale up the pilot.

In 2013, Tanzanian Agricultural Research Institute (TARI), IITA and MEDA began engaging with the Tanzanian Official Seed Certification Institute (TOSCI) to require seed certification for cassava, potato and sweetpotato. The Tanzania Seed Act, passed in 2003, made provision for a National Seeds Committee to oversee the establishment of a seed certification and enforcement system for, ultimately, all seed sold commercially. As of 2013, the committee, which is convened by TOSCI, had passed regulations for the main commercially-grown crops such as maize and cotton, but not for vegetatively-propagated crops. TOSCI began organizing meetings to develop regulations in consultation with the key stakeholders including NGOs, commercial seed producers and farmers' representatives. TARI, IITA and MEDA supported the work. TOSCI convened a technical committee to draft a cassava clean seed inspection and certification protocol that was approved by the National Seeds Committee and published in January 2017. In the same month, seed regulations for cassava, sweetpotatoes and potatoes were gazetted. This included a description of how inspections and certification should happen, including fees to be charged by TOSCI inspectors.

As of October 2020, 80 extension officers were gazetted by the Ministry of Agriculture and received their IDs to support seed inspection by TOSCI,[16] 64 men and 16 women. A further 25 extension officers had been trained awaiting a second gazettement, of which 20 are men and 5 are women.

[15] Respondent 11
[16] Respondent 9

The regulations covered pre-basic, basic, certified-1 and certified-2 seed, but not quality declared seed (QDS). The technical committee developed a QDS protocol to cover all crops including cassava which was gazetted in 2020. A change in Minister of Agriculture in 2018 meant that some parts of the approval process needed to be redone.

QDS allows registered trained small-scale farmer or a group of small-scale farmers producing seed for their own use or for sale to the neighboring farmers within the District where the QDS is produced.[17] QDS is important as it provides the regulatory framework in which cassava seed entrepreneurs being supported by the BEST Cassava project will operate. The BEST Cassava project's objective is to establish to establish a market-led cassava seed system in Tanzania for smallholder farmers to have timely access to quality-assured, disease-resistant and higher yielding cassava seed varieties in the right quantities at an affordable price. The project aims to set up more than 430 seed entrepreneurs by 2021 that will pay for inspections according to gazetted rates, to provide clean seed to more than 29,000 cassava farmers out of several million.[18] The seed entrepreneurs operate under QDS and purchase clean seed from certified producers.

According to two respondents, an agreement signed with China to purchase thousands of tons of dried cassava in 2017 has led to an increased demand for clean, disease-resistant and high yielding planting material in anticipation of increased demand. A respondent estimates that about 1% of cassava production in Tanzania makes use of clean planting material.[19]

EQ1.2 How does the 'change in capacity' main outcome manifest itself in the outcome trajectory?

Finding 4: Long-term close working relationship between IITA/RTB and the Ministry of Agriculture in Tanzania has meant that the development and approval of cassava seed standards has not required overt advocacy. Nevertheless, leaders in TOSCI, TARI, IITA/RTB and MEDA clearly have and continue to champion the trajectory.

As the timeline in Appendix 1 shows, IITA has had a long history of working on cassava in Tanzania, beginning in the 1970s when it founded its cassava breeding program on disease-resistant hybrids developed at the Amani Research Station in the north east of the country. In the 1980s, IITA collaborated with the Ministry of Agriculture on the biological control of cassava mealybug. During the 1990s IITA worked in Tanzania as part of two networks, the East Africa Root Crop Research Network (EARRNET) and the Southern African Root Crop Research Network (SARRNET). In the 2000s, as part of the GLCI, IITA worked with staff from the predecessors to TOSCI and TARI from 2007 which continued with the 5CP project that started in 2012. One respondent described IITA as being very well integrated in to the Ministry of Agriculture, working on MoA priorities with good lines of communication.[20] As a result, IITA has been able to give shape to and motivate the current cassava seed system trajectory without the explicit identification and training of champions to influence policy makers in the Ministry of Agriculture. Nevertheless, champions have clearly played critical roles, at different institutional levels. The trajectory has received strong support and leadership from TOSCI staff since 2013, and from TARI researchers since their involvement in the Great Lakes Cassava Initiative that began in 2009. One example is that the TOSCI staff were able to identify and work with an influential ministerial advisor to help maintain momentum on QDS standards after a new minister of agriculture took over in 2018.[21] In this process,

[17] https://tinyurl.com/yxv4r2b5
[18] https://www.meda.org/market-systems-projects/576-tanzania-building-an-economically-sustainable-seed-system-for-cassava-in-tanzania-best-cassava
[19] Respondent 11
[20] Respondent 2
[21] Respondent 1 & 3

IITA, MEDA and TARI staff have themselves learned more about what it takes to navigate the Seed Act regulation development and approval process from TOSCI colleagues, likely making them more effective 'change agents' in the future.

Finding 5: The BEST Cassava project is advocating that District Councils use funds allocated to them to support the production, processing and commercialization of cassava. This has involved a project advocacy team training 'champions' at District level. Less emphasis may have been put on advocating for seed certification than warranted because of a prohibition on 'lobbying' for legislation placed by the donor BMGF on its grantees, and a lack of clarity on the difference between 'lobbying' and 'advocating.'

The BEST Cassava project is currently working with a network of district champions to promote the production, processing and commercialization of cassava in Tanzania.[22] District Councils receive development funding from government which they decide how to spend. A cassava advocacy team, made of up representatives from the project implementing organizations – MEDA, TARI, TOSCI and IITA – meets with District Council members to advocate for greater support to strengthen the cassava value chain in their District. The team identifies 'champions,' often lead farmers, and train them on ways to make more money from cassava, including the use of clean planting material. The team pick individuals who are "believers" in the potential of a more market-led cassava value chain to help improve rural livelihoods and who will advocate for this among their peers and will also follow up on funding commitments made by their respective District Council. The cassava advocacy team has covered 78 cassava-growing districts in 11 regions.[23]

Despite good progress made, one respondent reflected that the BMGF projects may not have given sufficient priority to champions and advocacy because of the donor's stipulation that its projects should not engage in 'lobbying.'[24] According to a BMGF document available on the Web: "The funds or resources of BMGF must not be used to influence legislation ("lobbing"). Violation of this rule subjects the foundation to penalties, public disclosure and possible loss of charitable status." [25]

According to one respondent, the difference between lobbying and advocacy, which is allowed, is that the latter is not political.[26] Advocacy involves promoting technical and institutional solutions that are objectively beneficial which as a result are not likely to become party-political issues.[27] This can be somewhat of a grey area.

Finding 6: Other capacity development carried out by IITA/RTB and MEDA has played a major part in progress along the seed certification trajectory. This includes building the capacity of TOSCI to diagnose cassava diseases both in the laboratory and by 60 seed inspectors in farmers' fields. It also includes training more than 400 seed entrepreneurs to produce and sell planting material to meet quality standards for basic, certified and quality declared seeds.

The 5CP, MMB and BEST Cassava projects have all had a large capacity development component. The 5CP project has trained TARI staff in clean basic seed production. The project also helped upgrade TOSCI's laboratory to test for CBSD and CMD and staff to carry out the procedures. This has been part of a broader IITA/RTB strategy to build the capacity of national seed certification and inspection institutes that have traditionally been chronically underfunded.[28] The MMB and BEST Cassava projects have trained and supported

[22] https://twitter.com/jamesplegg/status/1222774586468515840
[23] Respondent 2
[24] Respondent 5
[25] https://docs.gatesfoundation.org/documents/advocacy-guidelines.pdf
[26] Respondent 2
[27] Respondent 2
[28] Respondent 11

seed entrepreneurs and seed inspectors. Training provided to more than 400 seed entrepreneurs involved building their ability to maximize production of cassava stems through improved agronomic practices. The BEST Cassava project has also trained 60 seed inspectors in a course that IITA/RTB developed with TARI. This proved resource intensive because the course needed to cover other crops that seed inspectors inspect.[29]

EQ1.3 How does the 'strengthened support base' outcome manifest itself in the outcome trajectory?

Finding 7: The support base for developing and implementing cassava seed certification has been strengthened in three ways. Firstly, IITA/RTB and MEDA, with BMGF funding, have been pushing for a more market-led cassava value chain so farmers are motivated to purchase clean seed and can pay for it. The government has helped by signing a deal with China to export thousands of tons of cassava a year, while the private sector has helped by setting up a cassava plant in Lindi. Secondly, the BEST Cassava project advocacy team has used the results of scaling work at District level to advocate 'bottom up' that more funds be sought from donors to support the cassava seed system. Thirdly, the MMB and BEST Cassava projects have set up and supported the Cassava Seed Growers' Association to help seed entrepreneurs to coordinate the testing of their fields by TOSCI and to help access credit, both of which make of a more enabling environment for the seed standard trajectory.

As just discussed, the sustainable seed system, of which seed regulations are an integral part, depends on their being a market for cassava such that farmers can afford to pay for clean seed and in turn seed producers can pay for certification and inspections. Strengthened market-orientation of the cassava value chain was given a major boost in 2017 when the Tanzanian Government signed an agreement with the Chinese Government to sell thousands of tons of cassava a year.[30] In 2018, the Prime Minister directed the Ministry of Trade, Industries and Investment and the Ministry of Agriculture to form a special committee to identify and resolve impediments to farmers selling cassava to the Chinese market.[31] In 2019, the Prime Minister also inaugurated a high-quality cassava mill in the coastal region of Lindi with a capacity to produce more than 6000 tons of flour per year, representing a major private sector investment.[32] According to one respondent, this has led to greater demand for high yielding varieties and clean seed in anticipation of greater demand.[33]

At national level, the BEST Cassava project advocacy team made key officials aware of progress in pilot Districts and the demand to expand the work to others. The team relate the broader work of TOSCI, TARI, MEDA and IITA to the National Agricultural Sector Development Strategy II[34] which stresses the importance of improved seed and stronger value chains among other priorities. The team made a case for the national government to provide letters of support for project proposals sent to country and multilateral donors, including BMGF and DfID.[35]

In 2016, the MMB project, the precursor to the BEST Cassava project, began setting up and supporting the Cassava Seed Growers' Association operating in there agroecological zones under the Ministry of Internal Affairs. One objective of the Association is to help seed entrepreneurs to coordinate the testing of their fields by TOSCI to bring the cost per entrepreneur down to affordable levels. Seed entrepreneurs have been able to

[29] Respondent 5
[30] https://allafrica.com/stories/201902260759.html
[31] https://www.tanzaniainvest.com/industry/first-cassava-flour-factory-open-in-tanzania
[32] https://www.tanzaniainvest.com/industry/first-cassava-flour-factory-open-in-tanzania
[33] Respondent 5
[34] http://extwprlegs1.fao.org/docs/pdf/tan160643.pdf
[35] Respondent 2

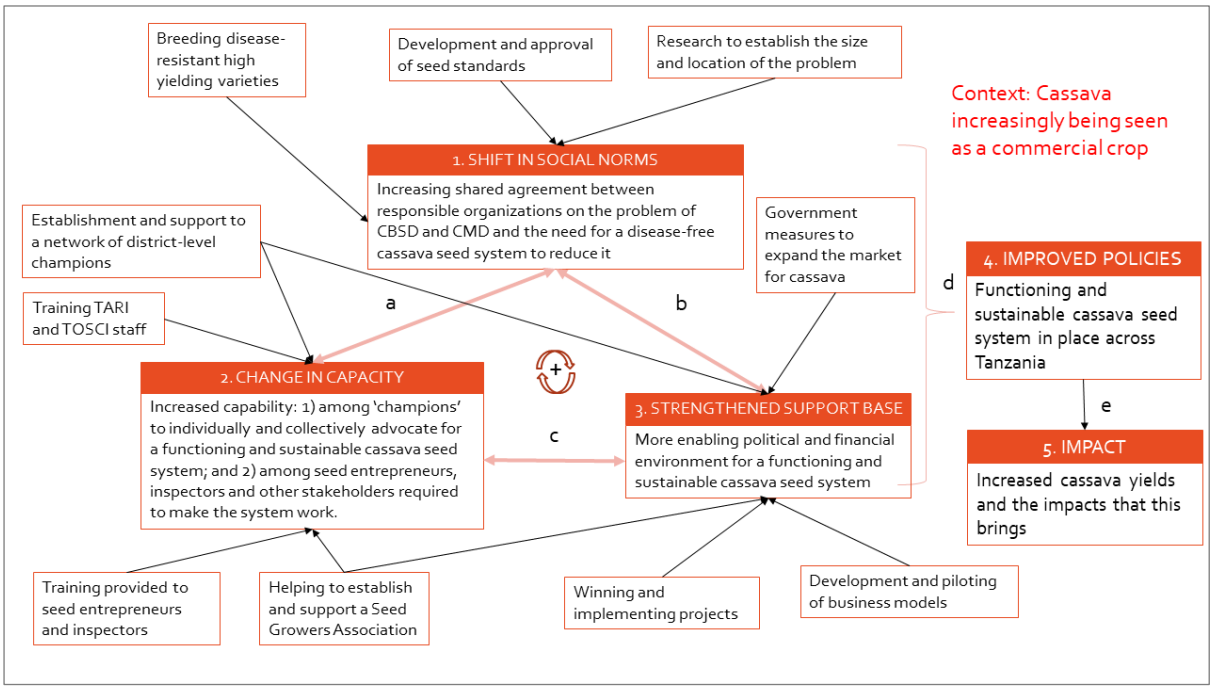
access credit through the association. Lower costs and credit both help create a more enabling environment for a sustainable seed certification and inspection system.

EQ1.4 Based on the answers above, what adaptations to the generic theory of change make it more relevant to the seed standards trajectory?

Finding 8: The generic policy windows theory of change was made more specific and relevant by identifying and describing what strategies contributed in practice to the model's three main outcomes– shift in social norms, change in capacity and strengthened support base. The main structural change is to recognize that the three main outcomes are linked to each other and form a self-reinforcing loop that drives the outcome trajectory.

The evaluator used the findings from the three questions above to adapt the generic policy window theory of change to be more specific about how cassava seed standards were developed and signed into law (Figure 4). The boxes contributing to the main outcomes are strategies carried out by a coalition of key stakeholders from IITA/RTB. TOSCI, TARI and MEDA who have been working on the seed standard trajectory since 2012. The exception is the box "Government measures to expand the market for cassava, e.g., deal with China."

Figure 4: Policy Window Theory of Change adapted to describe how seed standards were developed and are now being used in Tanzania



The causal assumptions underpinning the theory of change are indicated by letters in the diagram and are as follows:

a) The framing of the problem and solution motivates the champions. Because they are convinced, champions play an important role in convincing key actors of the importance of the problem and solution, taking advantage of windows of opportunity
b) The framing of the problem and solution motivates donors and responsible organizations create a more enabling political and financial environment for the emergence of cassava seed system. Actors' perception

of a more enabling political and financial environment reinforces the message that tackling a disease-free cassava seed system is possible and a high priority.

c) Seed system champions lobby donors and political leaders. At the same time leaders support champions in their role.
d) A positive feedback loop (shown in the center of the diagram) provides momentum to develop, implement and scale up a cassava seed system across Tanzania
e) The existence of a functioning and sustainable cassava seed system leads to higher cassava yields and the impact that this brings

The evaluator found evidence to support the first four causal assumptions, at least by inference.

The specified theory of change shows the strategies that contributed to achieving the main outcomes. Table 1 provides examples of the strategies used, drawn from the descriptions of the cassava seed certification system trajectory.

Table 1: Specifics of the activities, processes and outputs carried out within the cassava seed certification system trajectory that contribute to the three main policy window outcomes

Strategy	Examples
1. SHIFT IN SOCIAL NORMS	
Research to establish the size and location of the problem	Increase in research papers on CBSD and CMD from 75 in 1990 to a cumulative total of 250 in 2010 including research on the causes, location and nature of the two diseases – see Finding 2.
Development and approval of seed standards	Development and gazettement of a cassava seed certification protocol and regulations to support it – see Finding 1
Breeding disease-resistant high yielding varieties	IITA has a long history of breeding cassava in Tanzania, beginning in 1970s and including work under the 5CP project – see Finding 4
2. CHANGE IN CAPACITY	
Establishment and support to a network of district-level champions	BEST Cassava project trained District-level champions to advocate for Districts to use funds allocated to them to support the production, processing and commercialization of cassava – see Finding 5
Training TARI and TOSCI staff	5CP project trained TARI staff in clean basic seed production and TOCSI staff in seed certification scheme implementation including upgrading lab skills – see Finding 6
Training provided to seed entrepreneurs and inspectors	MMB and BEST Cassava provided training to more than 400 seed entrepreneurs – see Finding 6
3. STRENGTHENED SUPPORT BASE	
Winning and implementing projects	Proposing and winning 5CP, MMB and Best Cassava projects involving IITA/RTB, MEDA, TARI and TOSCI to develop and implement a sustainable cassava system – see Finding 6 and 7
Helping to establish and support a Seed Growers Association	MMB and BEST Cassava projects have set up and supported the Cassava Seed Growers' Association to help seed entrepreneurs to coordinate the testing of their fields by TOSCI and to help access credit – see Finding 7
Development and piloting of business models	MMB and BEST Cassava projects developed and piloted seed entrepreneur business model with 400 individuals – see Finding 11
Government measures to expand the market for cassava, e.g. deal with China	Government strategy to expand the market for cassava independent of the seed certification trajectory. This includes establishment of cassava flour processing plant and striking a deal with China to buy large amounts of cassava – see Finding 7

EQ2: What are the main outcomes resulting from the cassava seed standards trajectory and how did IITA/RTB contribute to them?

Finding 9: The main outcome from the cassava seed standards trajectory has been the passing into law of cassava seed standards for all seed qualities, from pre-basic to QDS. IITA/RTB has played a central role in creating, shaping and moving the trajectory forward, helped by strong and consistent working relationships with staff from TOSCI, TARI and MEDA, all of whom played a necessary role without which the trajectory would have been very different, and likely far less successful. The four organizations have formed a *de facto* coalition funded by the BMGF through a series of projects, beginning with the GLCI in 2009 and set to continue until 2024. IITA/RTB has contributed to the trajectory technically, for example by upgrading TOSCI's testing laboratory and training staff, and through keeping the coalition together.

Cassava seed standards results are shown in Table 2, together with the contribution made by IITA/RTB to achieving them. The main outcome has been the signing into law in 2017 of regulations governing cassava, sweetpotato and potato planting material as an amendment to the Seed Act. A second outcome has been another amendment made in 2020 laying out regulations for QDS for all crops, including cassava. Together, the standards are expected to provide the regulatory framework for a functioning and sustainable cassava seed system. The experience in Tanzania has been used by Rwanda to help pass similar amendments.

Table 2 shows that IITA has substantially contributed to the cassava seed certification trajectory since 1997 when IITA worked with NARO in Uganda to develop a quality management protocol for cassava seed that was the precursor to the regulations signed into law in Tanzania in 2017. IITA/RTB staff have been part of a *de facto* cassava seed system program including researchers and leaders from TOSCI, TARI and MEDA. The coalition began as part of GLCI and added members when it was able to persuade BMGF to fund three projects to continue work on building a clean and sustainable cassava seed system in Tanzania. When the three projects ended in 2017, the seed system work continued under the BEST Cassava project, also funded by BMGF. The project is led by MEDA with IITA, TOSCI and TARI as partners, in other words, allowing the *de facto* coalition to continue to move the trajectory forward. The support to the coalition is set to continue in second phase called BASICS II which will see BEST joining forces with the Building an Economically Sustainable, Integrated Seed System for Cassava in Nigeria (BASICS) project led by IITA/RTB.

Table 2: Table of main cassava seed system-related results and IITA/RTB contribution to them

Date	Cassava seed system-related results	IITA/RTB contribution
1970s to present	IITA and national programs in the region develop and release CMD and CBSD-resistant varieties	Up until 2000s, success of IITA's disease - resistant varieties make good phytosanitary management seem less important, in particular given difficulty to implement management practices
1997	ACDI-VOCA cassava project develops a quality management protocol (QMP) that is the precursor to certification and inspection guidelines published by TOSCI in 2017	IITA worked with NARO in Uganda to develop the QMP
2007 to 2012	Great Lakes Cassava Initiative leads to: - Further development and use of the QMP - Researchers realize that expecting planting material to by completely free of virus is unrealistic - The realization among cassava breeders and more widely that good phytosanitary	IITA was an implementing partner in the project, responsible for disease research.

Date	Cassava seed system-related results	IITA/RTB contribution
	practice is necessary to prevent spread of virus diseases, even with disease-resistant varieties	
2012	- BMGF agree to fund a suite of three interlinked projects to improve the cassava seed system and value chain in Tanzania - This leads to the creation of a de facto cassava seed system team made up of staff from TARI, TOSCI, MEDA and IITA[36]	The understanding of the importance of clean cassava planting material emerged in GLCI. IITA researchers played a pivotal role in making the case for the work to BMGF
2014	Draft cassava seed inspection and certification protocol developed and sent to TOSCI for review	Developed as part of the 5CP project, led by IITA
2016	Cassava Seed Growers Association established to support seed entrepreneurs and subsequently supported	Establishment supported by the cassava seed system team through the MMB Project and then by BEST Cassava project.
2017	Cassava Seed Inspection and Certification Protocol published by IITA supported by TOSCI, TARI and MEDA[37]	Process supported and motivated by the 5CP project
2017	Seeds (Amendment) Regulations for cassava, sweetpotato and potato are gazetted[38]	Process supported and motivated by the 5CP project
2017	SeedTracker adopted by TOSCI	SeedTracker developed by IITA/RTB
2017	BMGF fund BEST Cassava project to support the evolution of a more market-led cassava seed	Funding as a result of the progress made by the suite of three previously-funded projects of which IITA was part
2017	Chinese government signs an agreement to purchase thousands of tons of dried cassava from Tanzania, with the prospect that this will increase demand	No IITA/RTB involvement
2018	TOSCI publishes 5-year Action Plan for Cassava Seed Certification[39]	An output of the BEST Cassava project in which IITA is an implementing partner
2019	60 agricultural extension officers trained on cassava seed inspection and certification and gazetted	Ditto
2019	Cassava flour factory inaugurated by Tanzanian PM in coastal province of Lindi	IITA/RTB provided technical advice to the factory owners on the best cassava varieties to use. Factory grows these varieties.
2020	QDS regulations gazetted for all seed, including cassava	IITA/RTB researchers supported the technical development and approval process

EQ 3: Has IITA/RTB contributed to integration/consideration of gender in the cassava standards trajectory?

Finding 10: IITA/RTB has not yet contributed to the integration of gender in the cassava seed certification trajectory. MEDA and IITA are planning a gender assessment of the Tanzania cassava seed system and gender targets are being set for new projects.

[36] https://reliefweb.int/report/united-republic-tanzania/tanzania-gates-foundation-partners-launch-three-new-initiatives
[37] https://mel.cgiar.org/uploads/reporting/HzXJoXt3rKxIPkGBvW793djzhm7IhS.pdf
[38] https://mel.cgiar.org/reporting/download/report_file_id/9016
[39] https://mel.cgiar.org/reporting/download/report_file_id/12701

The cassava standards outputs and outcomes (Table 1) have documents associated with them. The evaluator reviewed these documents to establish the extent to which gender and social inclusion has been integrated, in particular:

- Cassava Seed Inspection and Certification Protocol
- Seeds (Amendment) Regulations for cassava, sweetpotato and potato
- 5-year Action Plan for Cassava Seed Certification
- QDS regulations published in the Gazette of The United Republic of Tanzania.

No mention of gender was found.

MEDA carried out a gender assessment in 2018 to be aware of gender dynamics in the cassava seed system in Tanzania. MEDA and IITA are planning an up-to-date gender assessment for the second half of 2020, leveraging MEDA's Gender Specialist based at headquarters in the US and IITA's Gender Specialist based in Tanzania. Currently, 20% of the seed entrepreneurs that the BEST Cassava project is working with are women and the target for new projects is 50%.[40]

One respondent reflected that previously gender researchers in RTB have tended to want to carry out strategic research on issues such as how social context shapes agency. This took them to levels of high abstraction from which it has proved difficult to map back to answer practical questions that could help shape cassava seed certification policies and regulations.[41]

EQ 4: Is the cassava seed certification trajectory likely to be sustained and scale over the long term?

Finding 11: It is likely that the cassava seed certification trajectory will be sustained and scaled over the long term because:

- Of the importance of cassava in Tanzania and the political support this brings, in particular initiatives to stimulate demand for cassava;
- Of a shared understanding of the need for a seed system that provides clean planting material;
- Of the strength of a coalition of researchers from TARI, TOSCI, IITA and MEDA that are pushing the trajectory forward;
- Of sustained financial support to the coalition from BMGF that will continue for the next four years;
- The necessary seed standards have been written into law;
- Capacity to implement the seed standards has been built among TOSCI staff, seed inspectors and seed entrepreneurs;
- The seed entrepreneur business model has been piloted and is working for 400 individuals, supported by an association and SeedTracker to link demand to certified supply of clean seed.

Future success will depend on continuing to simultaneously build the market for cassava, the availability of clean planting material and farmers' willingness to pay for it. Seed entrepreneurs need to be certified, for which a payment method is required that avoids seed entrepreneurs paying seed inspectors directly.

[40] Respondent 5
[41] Respondent 16

Conclusions

Conclusion 1: The Policy Window theory of change has helped understand how IITA/RTB contributed to the seed certification system trajectory. IITA, and later IITA/RTB, has a long history of research on cassava in Tanzania and the region. This has helped frame and clarify the impact of CMD and CBSD and the solution of making available to farmers clean planting material of high-yielding and disease-resistant varieties. IITA/RTB has also contributed to capacity development and creating an enabling environment for a sustainable seed system to take root and flourish. Perhaps IITA/RTB's greatest contribution to the trajectory has been to build and sustain a coalition of key stakeholders beginning in the Great Lakes Cassava Initiative, with strong support from the BMGF, which is set to continue until at least 2024.

Conclusion 2: One objective of the Tanzania seed certification system trajectory has been achieved with seed standards passed onto law. Good progress has also been made in creating a sustainable cassava seed system that meets the standards in building capacity to grow, test and certify clean planting material by seed entrepreneurs and seed inspectors, respectively. Progress has also been made in increasing the market for cassava.

Conclusion 3: At national level, the coalition helped generate ownership of the trajectory by key individuals from key institutions such that overt advocacy for establishing a cassava seed certification system was not necessary. IITA/RTB is leading an advocacy initiative for a greater market orientation in the cassava value chain that indirectly supports the use of the cassava seed standards.

Conclusion 4: The scaling and sustainability of a market-led cassava value chain depends on farmers wanting to, and being able to buy planting material that meets cassava seed standards. This depends on a number of factors that need to co-evolve including: increasing the market for cassava; training of, and a payment system for, inspectors; certified seed entrepreneurs aware of the standards and able to meet them; and, farmers sufficiently trusting in the seed system to use it. The co-evolution is happening and will be supported by a second phase of the BEST Cassava project – BASICS II.

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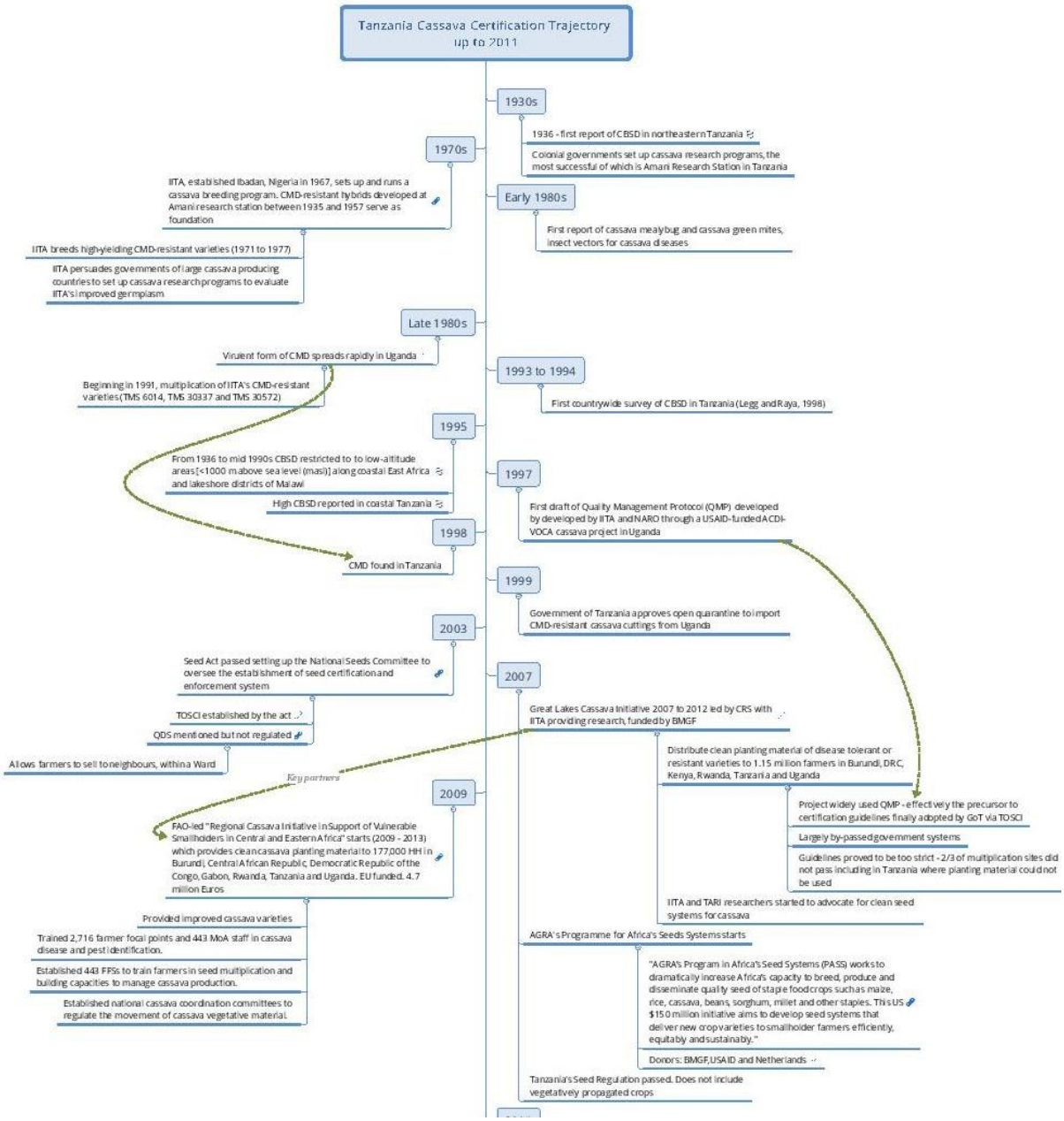
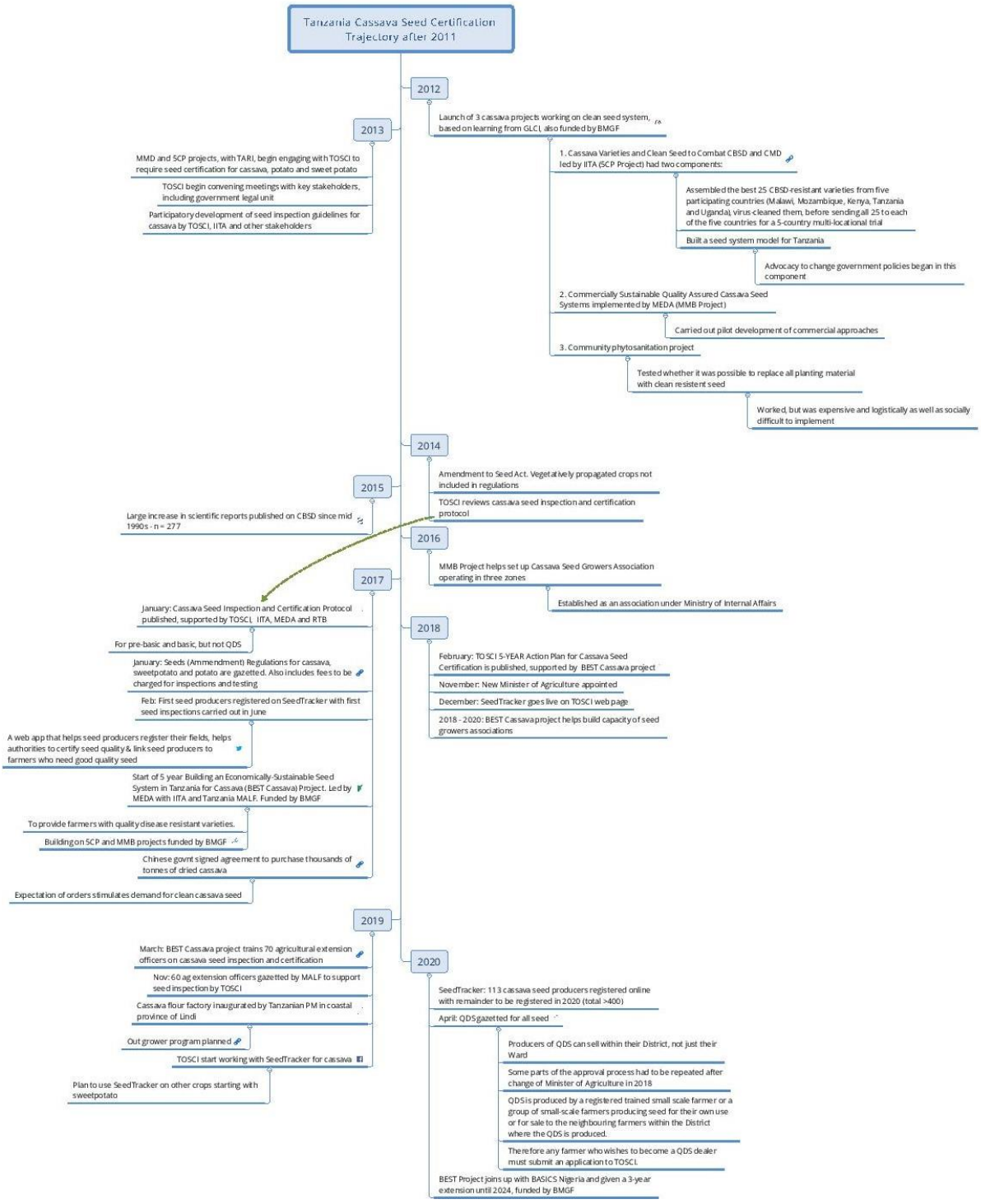
Appendices

Appendix 1: Timeline of the Tanzania cassava seed certification outcome trajectory

The timeline identifies the main events, happenings and processes that led to the outcome claimed by IITA/RTB. The timeline is split into two parts to better fit on the page – from 1930s until 2011, and from 2012 to 2020. The timeline is used to help specify the outcome trajectory and answer the evaluation questions in the main body of the report.




Tanzania Cassava Seed Certification Trajectory after 2011
2012
Launch of 3 cassava projects working on clean seed system, based on learning from GLCI, also funded by BMGF
1. Cassava Varieties and Clean Seed to Combat CBSD and CMD led by IITA (5CP Project) had two components:
Assembled the best 25 CBSD-resistant varieties from five participating countries (Malawi, Mozambique, Kenya, Tanzania and Uganda), virus-cleaned them, before sending all 25 to each of the five countries for a 5-country multi-locational trial
Built a seed system model for Tanzania
Advocacy to change government policies began in this component
2. Commercially Sustainable Quality Assured Cassava Seed Systems implemented by MEDA (MMB Project)
Carried out pilot development of commercial approaches
3. Community phytosanitation project
Tested whether it was possible to replace all planting material with clean resistent seed
Worked, but was expensive and logistically as well as socially difficult to implement
2013
MMD and 5CP projects, with TARI, begin engaging with TOSCI to require seed certification for cassava, potato and sweet potato
TOSCI begin convening meetings with key stakeholders, including government legal unit
Participatory development of seed inspection guidelines for cassava by TOSCI, IITA and other stakeholders
2014
Amendment to Seed Act. Vegetatively propagated crops not included in regulations
TOSCI reviews cassava seed inspection and certification protocol
2015
Large increase in scientific reports published on CBSD since mid 1990s - n = 277
2016
MMB Project helps set up Cassava Seed Growers Association operating in three zones
Established as an association under Ministry of Internal Affairs
2017
January: Cassava Seed Inspection and Certification Protocol published, supported by TOSCI, IITA, MEDA and RTB
For pre-basic and basic, but not QDS
January: Seeds (Ammendment) Regulations for cassava, sweetpotato and potato are gazetted. Also includes fees to be charged for inspections and testing
Feb: First seed producers registered on SeedTracker with first seed inspections carried out in June
A web app that helps seed producers register their fields, helps authorities to certify seed quality & link seed producers to farmers who need good quality seed
Start of 5 year Building an Economically-Sustainable Seed System in Tanzania for Cassava (BEST Cassava) Project. Led by MEDA with IITA and Tanzania MALF. Funded by BMGF
To provide farmers with quality disease resistant varieties.
Building on 5CP and MMB projects funded by BMGF
Chinese govnt signed agreement to purchase thousands of tonnes of dried cassava
Expectation of orders stimulates demand for clean cassava seed
2018
February: TOSCI 5-YEAR Action Plan for Cassava Seed Certification is published, supported by BEST Cassava project
November: New Minister of Agriculture appointed
December: SeedTracker goes live on TOSCI web page
2018 - 2020: BEST Cassava project helps build capacity of seed growers associations
2019
March: BEST Cassava project trains 70 agricultural extension officers on cassava seed inspection and certification
Nov: 60 ag extension officers gazetted by MALF to support seed inspection by TOSCI
Cassava flour factory inaugurated by Tanzanian PM in coastal province of Lindi
Out grower program planned
TOSCI start working with SeedTracker for cassava
Plan to use SeedTracker on other crops starting with sweetpotato
2020
SeedTracker: 113 cassava seed producers registered online with remainder to be registered in 2020 (total >400)
April: QDS gazetted for all seed
Producers of QDS can sell within their District, not just their Ward
Some parts of the approval process had to be repeated after change of Minister of Agriculture in 2018
QDS is produced by a registered trained small scale farmer or a group of small-scale farmers producing seed for their own use or for sale to the neighbouring farmers within the District where the QDS is produced.
Therefore any farmer who wishes to become a QDS dealer must submit an application to TOSCI.
BEST Project joins up with BASICS Nigeria and given a 3-year extension until 2024, funded by BMGF

Appendix 2: List of interviewees and participants in validation workshop

Name	Gender	Affiliation	Interview	Workshop
Patrick Ngwediagi	M	TOSCI	No	Yes
Kiddo Mtunda	F	TARI	Yes	Yes
Regina Kapinga	F	IITA	Yes	Yes
Juma Yabeja	M	IITA	Yes	Yes
Stephen Magige	M	MEDA	Yes	Yes
David Eagle	M	MEDA	Yes	Yes
Burton Nsape	M	CSE	No	Yes
Getrude Mtenga	F	ASI	Yes	
Upendo Mndeme	F	MoA	Yes	
James Legg	M	IITA	Yes	Yes
Edward Kanju	M	IITA	No	Yes
Vivian Polar (RTB)	F	RTB – workshop facilitator	N/A	Yes
Claudio Proietti (RTB)	M	RTB – workshop facilitator	N/A	Yes
Boru Douthwaite	M	Selkie Consulting Ltd. - Evaluator	N/A	Yes

The CGIAR Research Program on Roots, Tubers and Bananas (RTB) is a partnership collaboration led by the International Potato Center implemented jointly with the Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT), the International Institute of Tropical Agriculture (IITA), and the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), that includes a growing number of research and development partners. RTB brings together research on its mandate crops: bananas and plantains, cassava, potato, sweetpotato, yams, and minor roots and tubers, to improve nutrition and food security and foster greater gender equity especially among some of the world's poorest and most vulnerable populations. **www.rtb.cgiar.org/**

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