REPORT
ON
YIELDWISE LESSONS AND RECOMMENDED STRATEGIES FOR PROJECT SCALE OUT BEYOND MAIZE VALUE CHAINS AND TANZANIA

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List of Acronyms

AfDB        African Development Bank
AGRA        Alliance for Green Revolution in Africa
AMCOS       Agricultural Marketing Cooperative Society
ANSAF       Agricultural Non-State Actors Forum
BMGF        Bill and Melinda Gates Foundation
BRTEN       Building Rural income Through Enterprises
CAPEX       Capital Expenditures
CRDB        Cooperatives Rural and Development Bank
CSDI        Centre for Sustainable Development Initiatives
DAICO       District Agriculture, Irrigation and Livestock Officers
EABL        East Africa Breweries Limited
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<th>Acronym</th>
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<tr>
<td>EAGC</td>
<td>Eastern Africa Grain Council</td>
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<td>EBT</td>
<td>Equity Bank of Tanzania</td>
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<td>ETG</td>
<td>Export Trading Group</td>
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<td>FDC</td>
<td>Forward Delivery Contract</td>
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<td>FGD</td>
<td>Focused Group Discussion</td>
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<td>FOs</td>
<td>Farmer Organizations</td>
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<td>FRI</td>
<td>Farm Radio International</td>
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<td>FtMA</td>
<td>Farm to Market Alliance</td>
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<td>GAP</td>
<td>Good Agricultural Practices</td>
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<td>IFC</td>
<td>International Finance Corporation</td>
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<td>MOA</td>
<td>Ministry of Agriculture</td>
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<td>MSC</td>
<td>Most Significant Change</td>
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<td>MT</td>
<td>Metric Tons</td>
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<td>NFRA</td>
<td>National Food Reserve Authority</td>
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<td>NMB</td>
<td>National Micro-finance Bank</td>
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<td>PASS</td>
<td>Private Agriculture Sector Support</td>
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<td>PH</td>
<td>Post-Harvest</td>
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<td>PHL</td>
<td>Post-Harvest Loss</td>
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<td>PHT</td>
<td>Post-Harvest Technology</td>
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<td>PIATA</td>
<td>Partnership for Inclusive Agricultural Transformation in Africa</td>
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<td>PPTL</td>
<td>Pee Pee Tanzania Limited</td>
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<td>RAA</td>
<td>Regional Agriculture Advisor</td>
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<td>RUDI</td>
<td>Rural Urban Development Initiatives</td>
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<td>SACCOS</td>
<td>Savings and Credit Cooperative Society</td>
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<td>SDG</td>
<td>Sustainable Development Goals</td>
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<td>SHFs</td>
<td>Smallholder Farmers</td>
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<td>SME</td>
<td>Small &amp; Medium Enterprises</td>
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<td>TADB</td>
<td>Tanzania Agricultural Development Bank</td>
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<td>TPB</td>
<td>Tanzania Postal Bank</td>
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<tr>
<td>UNCDF</td>
<td>United Nations Capital Development Fund</td>
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<td>USSL</td>
<td>Union Service Stores Limited</td>
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<tr>
<td>VAT</td>
<td>Value Added Tax</td>
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<td>WFP</td>
<td>World Food Programme</td>
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<td>YWS</td>
<td>YieldWise Project</td>
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Executive Summary

Post-harvest losses are a major drain to smallholder farmers’ resources, incomes and livelihoods. The Rockefeller Foundation has identified in its YieldWise Initiative that food loss significantly reduces what farmers are able to get to market and consequently results in income losses of 15% or more for 470 million smallholder farmers, as well as for food traders, processors, transporters, and retailers. (Food and Agriculture Organization of the United Nations (FAO)

Together with the Rockefeller Foundation, AGRA designed the YieldWise (YWS) Maize Project in Tanzania with the aim of reducing post-harvest losses of maize by at least 50% and to increase incomes of smallholder farmers by 25%. The model integrates five components: (1) Market demand and linkages, (2) farmer aggregation and training (3) access to finance, (4) increasing access to post harvest loss technologies and practices, (5) prioritization of loss prevention and knowledge management. The project term is 1 April 2016 to 31 December 2019.

As the project nears its end, AGRA commissioned a study to document lessons gained from this project with the intention to utilize and transfer learnings generated in loss reduction in the maize value chain work in Tanzania to address post-harvest loss issues in other crop value chains and transfer these learnings to other countries where AGRA has project operations.

AGRA is working under the “Partnership for Inclusive Agricultural Transformation in Africa” (PIATA ) in 11 countries, including Tanzania, , to increase the incomes and improve food security for nine million farm households through the direct result of activities of AGRA, to increase productivity and access to markets and finance; and contribute to increasing the incomes and improving food security of another 21 million farm households through support to: i) strengthening capacities of governments and private sector, and ii) policies, programs, and partnerships that increase productivity and access to markets and finance.

The study involved key informant interviews with 14 institutions and 8 focus farmer discussion groups with 65 participants, 50 men and 15 women. The geography covered included Dar es Salaam, Ruvuma (Songea), Njombe, Iringa, Arusha, Manyara and Kilimanjaro.

The following are the key lessons that were distilled from these interviews:

Post-harvest loss management should be holistic and address the whole value chain and its actors. This includes production and improvement in productivity to make farmers competitive in the market.

Where market demand is assured and within an enabling policy environment, farmers are ready to adopt and invest in post-harvest technologies.
Off-takers or buyers must lead in Farmer Organization mobilization of any market led aggregation model, participate in the design of contracts with the farmers and share information on market quality and volumes required.

Forward Delivery Contracts (FDCs) were a new concept with majority of the farmers and other stakeholders in the project. Enforcement of FDCs did not work for both parties involved; farmers and anchor buyers. Farmers defaulted when market price was higher than contract price, and buyers defaulted when market price was lower than contract price. Contract arrangements should be developed with sufficient incentives for Farmer Organizations (FOs) and off-takers to improve commitment and trust. An affordable Price risk insurance cover could be considered, similar to the production insurance cover provided (annex 9.5).

In YieldWise Project, leveraging on the partnership with Farm to Market Alliance (FtMA)\(^1\) enhanced YieldWise Project outcomes as their entry led to the inclusion of GAP as a deliverable component of the project which was highly appreciated by the farmers. The farmer maize productivity more than tripled in most areas from an average of 500 kg per acre to 2,200 kg per acre. The more progressive farmers achieved 3,000 kg per acre (7.4MT/ha); as a result, anchor buyers used 15 bags (1,500 kg) per acre (3.6MT/ha) as the reference yield in negotiating floor prices for FDCs.

Policy constraints, especially maize export bans and export permits in 2016/2017 crop season resulted in price collapse as the domestic market could not absorb the surplus. This made farmers unable to repay the input loans they had taken. The following season (2018/2019), they cut down on input purchases resulting in low marketable surpluses.

Last mile delivery channels for the post-harvest technologies are necessary for continued uptake. Agro-dealers were found to be the best channel and were provided with financial support through a revolving fund. The fund uptake was low due to restrictive cover of the fund (only PHTs, while agro dealers wanted threshers, tractors, farm inputs included at 30/70 PHT/others. The project improved from 100% PHTs to 50/50. Despite farmers appreciation of the effectiveness of hermetic bags and re-use for 2-3 seasons, all participants felt the upfront cost of post-harvest technologies (PHTs) especially hermetic bags and silos was exorbitant and restricted wide adoption. (Annex 9.2 and 9.5)

Farmers were satisfied with hermetic bags for home storage because they do not need to add chemical pesticides (health appreciation) for the family food reserves. However, the price of hermetic bags at Tsh.4,500—5,000 per piece (US$2-2.20) was found to be too high by many farmers. An average of 5 – 6 hermetic bags is required per family to store maize and beans for

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\(^1\) FtMA is a consortium of several partner organizations and institutions that support African farming families to transition to commercial agriculture - https://ftma.org/
domestic consumption. Farmers prefer using chemical pesticides to preserve produce that is destined for the market because the market does not provide a premium for high quality produce. Produce is not traded under quality grading, e.g. a premium for Grade 1 maize and less for lower grades. From the perspective of the off-takers, they want to buy immediately after harvest in ordinary polypropylene bags for ease of storage and bag cost. (Tsh 800 for polypropylene bag compared to Tsh.4,500-5000 for hermetic bags). Farmers with forward delivery contracts were provided with polypropylene bags by the anchor buyers. Off-takers either trade the grain immediately or use alternative storage like hermetic silos. This could imply that hermetic storage bags are not the appropriate technology for off-takers and processors. All participating farmers said they experience the highest post-harvest losses at storage stage. For produce preserved with chemical pesticides, they have to re-apply every 4 months to stem weevil infestation. Rats and rodents were given as another threat during storage.

The YieldWise project was effective in achieving most of its objectives, despite some implementation challenges. It enhanced awareness on PHL, mitigation and available technologies and their distribution. Technology manufacturers/distributors leverage the YWS project to demonstrate and promote their products. The government, at national and local levels was sensitized on the importance to speed up mitigation of post-harvest losses. Most outstanding outcome of the YWS project is the participation in the development of the Tanzania National Post-harvest Strategy and providing support in printing 10,000 copies of the popular Kiswahili version of the strategy.

The following are the recommendations:

The maize value chain in Tanzania and many countries in Africa is highly competitive and characterized by the unpredictability of markets and prices, government policies on maize trade and generally lacking in produce quality premiums. The role of AGRA and other implementing partners should be to act as facilitators and provide a platform for private sector to promote more sustainable good agriculture practices (GAPs), Post-Harvest Loss (PHL) management technologies, farmer aggregation models that respond to the needs of the market and supporting agro-dealers for input supply.

Financial products should be designed with full engagement of the stakeholders, be clearly articulated and transparent. Financial products should cover agricultural inputs beyond Post-Harvest Handling (PHH) technologies - include threshers, grain cleaners, dryers, processing machinery, tractors, ploughs and tillers. All these contribute to post-harvest loss management and outcome.

Technical assistance to financial institutions, SMEs and micro-processors should be included in any fund targeting these to speed up access and outreach. Capacity strengthening is critical.
To improve efficiency in agricultural value chains, the whole value chain must be considered holistically for sustainability; and not just focus on one link in the system (in this case only PHL management was considered at project design). All stakeholders must be involved through a participatory, inter-disciplinary and gender-sensitive approach in the activities from seed variety selection and cultivation, post-harvest, value addition, and marketing. Farmers should be given a choice to select crop varieties that work for them.

Engagement of appropriate national apex institutions (research institutions, non-state actors, civil society), government and private sector is essential in order to promote scaling up and replication of success. The involvement of these stakeholders has the potential to pull together public private partnerships, develop value chains, coordinate public and private sector financing and achieve a critical mass of commercial agriculture and agribusiness that form part of YWS core objectives.

Government should reduce duties and taxes on post-harvest technologies to make them affordable to majority of farmers, especially for domestic food storage. Hermetic storage bags, silos, cocoons were found effective in prevention of post-harvest losses (PHL). Farmers preferred hermetic plastic silos to metal silos because of ease of storage, protect the produce from rats and rodents and can be put to other uses, and be stored inside their houses. The unavailability of plastic silos with local technology suppliers was a major concern for farmers. The ones they accessed through YWS were imported from Uganda manufacturers- Smileplast (Annex 3.1)

On the policy front, more advocacy is required to address policies that impede investment in PHL and farmer productivity. Well-articulated advocacy is necessary to resolve the emerging policy constraints including export bans, taxes on PHT, local levies (cess), tariff and non-tariff barriers and weights and measures regulations compliance (Annex.
1.0 Background Context of Study

1.1 Introduction

In Sub-Saharan Africa, post-harvest losses represent a key impediment to transforming smallholder agriculture from a solitary struggle to survive into farming as a business that thrives. For many smallholder farmers living in or near subsistence, increasing productivity and access to markets can help enhance their incomes enough to cover their investments in the next harvest, begin to diversify into other higher-value crops and livestock, and make investments in education and healthcare to improve their family’s well-being. Unfortunately, as the Rockefeller Foundation has identified in its YieldWise Initiative, food loss significantly reduces what farmers are able to get to market and consequently results in income losses of 15% or more for 470 million smallholder farmers, as well as for food traders, processors, transporters, and retailers. This inhibits the development of smallholder agriculture into a productive, efficient, and sustainable system, which is ultimately essential to ensuring food security, lifting millions out of poverty, and driving equitable growth across the continent.

African farmers are increasingly becoming aware of the productivity enhancing technologies. Despite supply chain related issues, farmers have started to access and adopt improved seed and fertilizer use. However, post-harvest losses often reverse productivity gains, while exerting pressure on the environment on resources that get wasted.

In Tanzania, AGRA is working to double the incomes of 1.5 million smallholder farmers by helping them increase their productivity and close the yield gap, reduce post-harvest losses, and access markets and finance. But analysis shows that there is limited access to post-harvest technologies (PHTs) in the country, such as storage facilities, PICS bags, dryers, threshers, etc. As a result, it is estimated that 30% of maize produced is lost; causing US$92 of opportunity loss per hectare, and ultimately significant reductions in what farmers can do to improve their lives.

AGRA’s work with the Rockefeller Foundation has demonstrated interventions that can reduce these post-harvest losses and significantly increase the incomes of smallholder farmers in Tanzania and elsewhere around the continent. Over the past 2 years, in a pilot phase of the Waste and Spoilage Initiative (later renamed YieldWise Initiative) in Tanzania, the partners have shown that linking market demand and aggregation of supply pulls in the uptake of post-harvest technologies and finance. This is highly enhanced by an enabling policy environment.

Together with the Rockefeller Foundation, AGRA designed the YieldWise (YWS) Project in Tanzania with the aim of reducing post-harvest losses by at least 50% and to increase incomes of smallholder farmers by 25%. The specific objectives of the project are:
1. Market Demand: Link 100,000 smallholder farmers to market demand for both large anchor buyers and local alternative markets;

2. Farmer aggregation and training: Upgrade 100 aggregation centers, train farmers in postharvest management, promote utilization of improved technologies, and aggregate their crops to meet buyer quantity and quality requirements;

3. Access to finance: Use innovative finance mechanisms to promote investments and facilitate distribution and acquisition of technologies;

4. Scale up adoption of Postharvest Handling technologies: Promote the adoption of appropriate loss-reducing technologies to improve crop handling, storage, and processing;


YWS is a specialist intervention in the postharvest and loss reduction for the entire set of smallholder farmers engaged by AGRA under the PIATA program in Tanzania. All the five objectives/components of YieldWise listed above are being promoted as a package. The financial partners that YieldWise has engaged (Equity Bank Ltd, Tanzania Postal Bank (TPB) and Tanzania Agricultural Development Bank (TADB)) and the postharvest technology manufacturers operate across the country including PIATA Consortia sites.

YWS initiative in Tanzania is scheduled to end this year, December 31, 2019, and AGRA intends to utilize and transfer learnings generated from the Foundation’s investments in loss reduction in the maize value chain work in Tanzania to address post-harvest loss issues in other crop value chains and transfer these learnings to other countries where AGRA has project operations under the PIATA partnership.

1.2 Purpose of the Study

1.2.1 Objective of the study

i. To assess the post-harvest (PH) management solutions and strategies promoted by YWS project in Tanzania

ii. Synthesize results obtained by identifying technical, commercial and social viability of post-harvest loss (PHL) solutions promoted by the YWS project

iii. Provide findings, strengths and weaknesses of the strategies and recommendations for future PHL interventions in other crops and countries for uptake and scale up.

iv. Document the stakeholders’ experiences at community level in a video documentary for wide dissemination and outreach
v. Review the AGRA consortium model of project delivery and propose how YieldWise model can be incorporated in the on-going value chain projects within AGRA work.

1.2.1 Scope of work

In order to fulfill the objectives of this study, the consulting team reviewed previous post-harvest studies, all YWS reports and carried out field visits during which data and information was collected through interactions with targeted stakeholder groups. The consulting team interviewed 21 key informants (KIs) representing 14 organizations (Appendices 3, 4, 5, 6, 7, and 8), and held 8 focus group discussions (FGDs) with farmers (Appendix 9). A total of 65 stakeholders were engaged in the study discussions and provided feedback on the project’s impact on their businesses.

The assignment took place in Dar es Salaam and selected regions where YieldWise is implemented. These regions are Arusha, Kilimanjaro and Manyara in the North; Iringa and Ruvuma in Southern Tanzania.

The following tasks were undertaken with the targeted groups:

a) Market Demand

Key Question: What are the needs of off-takers and processors for maize and other cereal crops? What is the capacity and coordination among the value chain players?

The key task here was the determination of how competitive the maize supply chain is, the margins, pricing mechanisms, price comparison between markets (local and regional) best value for time/money spend for farmers, and existing intervention gaps.

b) Farmer aggregation and training

Key Questions: What activities are the most important in the maize value chain in Tanzania? What incentives exist or do you recommend for value chain actors to collaborate?

The study reviewed the different aggregation models used by YieldWise, defined and identified strengths and weaknesses of the existing models and made recommendations on how aggregation and sourcing from farmers should be managed to maximize value for the farmer and buyer.

c) Access to finance

Key Question: How relevant, effective, impactful, and sustainable were the activities provided alongside equipment provision, with particular focus on women empowerment?
The study assessed the models used to finance the acquisition of equipment/technologies, using the lens described immediately above as well as geographic coverage. Recommendations of financing models that would be most effective in activity scale up in a context specific manner, highlighting enablers and potential constraints have been made. The study also identified policies that contribute to a favorable environment for the rapid scale up of equipment/technologies manufacturing and use.

d) **Scale up adoption of Postharvest Handling technologies**

Key Questions: Where do you see gaps in the market? Where are the biggest production or market inefficiencies? Local markets analysis (product availability, price dynamics and margins) was conducted, comparative levels of post-harvest losses between mechanized and labor use was determined, and additional findings on tangible impact has been shared. In addition, the availability of service providers for post-harvest technologies and services has been identified in this study. The study has determined the general user feedback on PHL technology performance (volume of grain lost, cost of technology, convenience, transportation cost, use of fodder, general satisfaction levels, areas of improvement, etc.).

e) **Prioritization of loss prevention and Knowledge management**

Key Questions: What is the loss measurement matrix of different key stakeholders? The study assessed the level of private sector investment in managing losses in staple crops and advocacy engagement with policy makers on post-harvest loss management.

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**2.0 Methodology**

The consulting team used the quality assurance approach with an aim of consolidating the information gathered to inform policy, implementation and make recommendations on the YieldWise project. Both secondary and primary data was collected on the five specific objectives of the YieldWise project, focusing on the processes that were involved during project initiation and implementation; the project successes; the project challenges; lessons learned; and recommendations for improvement. This approach helped the consulting team to capture lessons learned and case studies.

Case studies were drawn from the beneficiary groups using the most significant change approach; a documentation of success stories and any other positive deviant stories has been done. The consultancy team used the 10-step guide of MSC to validate the case studies. The MSC approach also helped the team to report on contribution and/or attribution of the YieldWise.
project to the impact experienced or likely to be experienced. The case studies provided briefs of key outcomes that have been recommended to AGRA Communication team for capture in a video documentary from project participants at community level.

Literature review on PH loss solutions and strategies specific on maize value chain in Tanzania was undertaken. This review included project documents and reports generated during project implementation.

Since this was a lessons learned study, the consulting team applied judgmental or authoritative sampling techniques to select the sample population, by using their own existing knowledge and professional judgment. This was also complemented by working closely with the project teams in various project areas to identify farmer organizations and aggregators, processors, service providers, local authorities to be interviewed.

For Qualitative Data collection sampling: Key informant interviews (KIIIs) and focus group discussions (FGDs) were conducted to get views from other project stakeholders. The project implementing staff and partners were interviewed to capture the challenges and opportunities for post-harvest loss mitigation and policy issues that impacted project implementation and proposed interventions. Also, the management or representatives of the financial partners that YieldWise have engaged (Equity Bank, Tanzania Postal Bank (TPB) and Tanzania Agricultural Development Bank (TADB)) and the postharvest technology manufacturers operating across the country including PIATA Consortia sites were interviewed. Others included service providers such as the hermetic bags producers A to Z and PICs bag distributors, and anchor buyers and alternative buyers of maize from farmers.

### 3.0 Key Study Findings

#### 3.1 Overview

When YieldWise Project began, the awareness and adoption of PHL management in Tanzania was sparse. Available technologies, awareness among farmers and utilizations were minimal. There were few existing service providers or vendors with in-depth knowledge and experience in post-harvest loss management. The agricultural production system of Tanzania was highly fragmented with informal relationships between farmers and small traders and/or brokers. Tanzania’s farming systems are largely rain-fed (89%), and thus extremely vulnerable to seasonal weather variability. Farming practices were impacted by: low access to improved inputs particularly fertilizer and seed; low adoption of Good Agricultural Practices (GAPs) in part due to a low extension to farmer ratio (1:3-4,000); limited access to formal or semi-formal financial services; and high post-harvest losses (27%) due to inadequate storage facilities, storage pests and diseases. Unpredictable government policies especially on maize export ban greatly impacted
market prices as the domestic market in high production areas could not absorb the surplus production.

YieldWise was designed to reduce post-harvest loss in maize by 50% and increase household income by 25%. The underpinning hypothesis was that if we create an enabling environment and link farmers to market, then the farmers would see value of adopting technologies and practices that will reduce loss and increase their production. This would in turn lead to reduction of cost and increased revenues from selling more quality produce. A reliable market would also facilitate them to unlock finance for inputs through forward contracts.

Through YieldWise support for farmer training in PHL management, access to technologies and finance; farmer aggregation, agro-dealers, off-takers and processors have been able to take steps towards using the knowledge acquired and investing in new technologies (improved seeds and fertilizers) and approaches (Good Agriculture Practices (GAP) that have increased maize production and reduced post-harvest losses (hermetic storage).

Over the course of the 3 year project period, and focusing on the 5 objectives, the following results have been achieved by the project:

**Market Demand:**

The project achieved aggregation of 260,975 metric tons (MT) of maize cumulative since April 2016 to December 2018. Out of the aggregated volume, 216,664 MT of maize was sold, equivalent of USD $29,524,728 (Source: YieldWise Report Qtr3 of 2019 to Rockefeller Foundation).

<table>
<thead>
<tr>
<th>Year</th>
<th>Aggregated (MT)</th>
<th>Volumes (MT)</th>
<th>Source of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>28,208</td>
<td></td>
<td>AGRA Interim Narrative Report (April to Dec 2016)</td>
</tr>
<tr>
<td>2017</td>
<td>17,921</td>
<td>45,974</td>
<td>AGRA Interim Annual Progress Report (Jan to Dec 2017)</td>
</tr>
<tr>
<td>2018</td>
<td>215,001</td>
<td>260,975</td>
<td>AGRA Interim Annual Progress Report (Jan to Dec 2018)</td>
</tr>
</tbody>
</table>

Source: YWS report to RF- April 2016- Dec 2018

At the time this study was being undertaken, the aggregated volumes for the year 2019 had not been compiled.
Farmer Aggregation and Training:

Through the project, 182,909 farmers were trained in both Good Agriculture Practice (GAP) and Post-Harvest Loss (PHL) management. The training component of the project was expanded to cover farmers in consortia using Village Based Advisors (VBAs) to reach a wide audience of farmers with training and information. In 2018, 3,165 Village Based Advisors (lead farmers) were identified and equipped with training skills and knowledge on effective post-harvest management practices of controlling crop quality, drying, threshing and cleaning, storage and grading through ToT workshops. Through PIATA consortia and working with VBAs, 93,459 farmers were trained in Post-Harvest Loss (PHL) reduction practices.

To date, 214 farmer organizations have received equipment support of 234 digital weighing scales, 860 tarpaulins, and 229 moisture meters. 21 buyers/SMEs have been supported with aggregation centers equipment to promote adoption and demonstration of PHL technologies to FOs while buying maize.

Table 2: Summary of Aggregation Centre Equipment Support

<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
<th>Weighing scales</th>
<th>Tarpaulins</th>
<th>Moisture meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer Organizations</td>
<td>214</td>
<td>234</td>
<td>860</td>
<td>229</td>
</tr>
<tr>
<td>SMEs</td>
<td>21</td>
<td>3</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Balance equipment in stock</td>
<td>37</td>
<td>60</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Equipment with defects</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sub Total</td>
<td>276</td>
<td>960</td>
<td>253</td>
<td></td>
</tr>
</tbody>
</table>

Access to Finance:

The Revolving Fund of USD 800,000 was implemented by Equity and Tanzania Postal Bank (TPB) who contribute USD 200K each while AGRA contributes USD 200,000 to each bank. The agreement signed between AGRA and Equity Bank on 22 April 2016 was renewed in March 2018 for a period of 18 months i.e. up to September 2019. While that between AGRA and TPB Bank was signed in April 2018 and implementation started in May 2018.

Funding agreement between AGRA and Tanzania Agriculture Development Bank (TADB) was signed in December 2018 and was to take 12 months to be fully utilized starting from 24 January, 2019. A grant account was opened by TADB where AGRA deposited USD 610,000. The bank is using its lending policy for approving the loans. The objective is to support SMEs/Processors to
invest in purchasing and installation of bulk steel silos and/or modern maize milling machines with the aim of reducing post-harvest losses in the maize value chain.

The grant will be used to de-risk the bank by attaching it to the repayment schedule. The grant will be used for part-repayment of loans given to SMEs who have borrowed for the sole purpose of purchasing and installing steel silos with capacity of storing a minimum of 500 metric tons or purchase and installation of maize milling machines with capacity of milling 30 metric tons per day of 8 working hours.

The maximum amount of grant to one SME shall be: Steel Silos - 30% of CAPEX – maximum - USD 80,000 and Milling Machines – 30% of CAPEX – maximum - USD 40,000.

**Technology Utilization and Distribution:**

The project supported 150 small and medium enterprises (SMEs), and led to 171 agro-dealers selling post-harvest technologies to 19,329 farmers. The technologies that were sold after demonstrations include 672 silos, 92,906 hermetic bags and 11,134 tarpaulins. (Source: YieldWise June 2019, Quarterly report).

The project has also been able to advocate the government and other stakeholders in Agriculture in Tanzania on issues related to PHL through engagements at different levels. YieldWise Project collaborated in the development of the National Post Harvest Management Strategy for Tanzania that was launched in August 2019. 2000 copies of the strategy document have been published in English and 10,000 in Kiswahili copies of popular version worth Tsh.10M, supported by the YieldWise project.

**Table 3: Objectives of Tanzania Post Harvest Management Strategy**

1. The Tanzania National Post-harvest Strategy outlines eight strategic issues as follows: Facilitate Awareness on Post-Harvest Management to Improve Efficiency and Reduce Crop Losses along the Value Chain;
2. Promote availability, accessibility, affordability and adoption of tested technologies and processes to reduce post-harvest losses;
3. Facilitate agricultural marketing systems to improve market access and minimize post-harvest losses;
4. Promote research and innovations of new and appropriate technologies and methods to reduce crop losses;
5. Review and put in place new legislations to ensure compliance with standards and adoption of practices to minimize PHL;
6. Strengthen institutional capacity, coordination, partnerships and stakeholders’ participation of PHM actors to enhance implementation of strategic interventions;
7. Adapt post-harvest management systems to mitigate the effects of climate change; and
8. Addressing inadequacy in PHM financing
Prioritization of PH loss prevention and Knowledge management: Storage infrastructure (primary collection centers) is the most significant challenge for cereal farmers in Tanzania, as more than 50% of the losses occur at this stage. Most FOs and AMCOs visited started constructing offices that comprise of warehouses where they can store about 100-300MT of their grain. The government is partnering with the government of Poland to construct metal silos in NFRA depot in Songea and other NFRA depots in high production areas, complete with cleaners and dryers. Construction of 50,000MT silos is on-going at the NFRA depot in Songea, Ruvuma Region. This is guided by the Vision and Mission of the National Post Harvest Management Strategy viz:

**Vision:** Reduced post-harvest losses along the commodity value chains, which adequately reward the actors and sufficiently contributes to national food and nutrition security and the economy.

**Mission:** To improve PHM by ensuring availability of appropriate postharvest and value-addition practices and technologies, providing incentives for investment in marketing systems, as well as improving capacities and coordination of strategic interventions.

3.2 Project Implementation

3.2.1 Implementing Partners

AGRA’s YieldWise Project started in October 2016 and was implemented by three partners who included The Center for Sustainable Development Initiatives (CSDI) as the lead implementing partner; together with Rural Urban Development Initiatives (RUDI), and Building Rural Income Through Enterprises (BRITEN). Each partner had a specific role in the project. CSDI was to work with SMEs and mobilize off-takers or buyers; work with manufacturers of technologies as well as agro-dealers and/or technology distributors; and contact financial linkages. RUDI and BRITEN were to mobilize and aggregate farmers, and train and build the capacity of farmers in PHL and GAP. Other roles for RUDI and BRITEN included supervision of aggregation and linking farmers to markets for volumes above the contract volumes and access finances through other channels. The target of farmers to be reached was 100,000 with RUDI having a target of 75% while BRITEN was given a target of 25% out of which 50% were to be youth and women enterprises.
In 2017, the entry of Farm to Market Alliance (FtMA) expanded the scope of the project by introducing the component of Good Agriculture Practices (GAP) training which was not initially in the YieldWise Project. Led by WFP, FtMA was comprised of a consortium of several partner organizations and institutions. AGRA is one of the partners in the FtMA consortium. Other partners are Bayer, GrowAfrica, IFC, RaboBank, Syngenta, WFP, YARA. With the entry of FtMA, Forward Delivery Contracts (FDCs) between farmers and buyers were to be managed by WFP. Furthermore, WFP undertook to take the lead in the mobilization of anchor buyers; while the alternative buyers were left to other implementing partners (CSDI, RUDI, BRiTEN). Other partners were added during the implementation of the project and included Innovare for equipment leasing model, and IPSOS on M&E, among many more partners, a move which brought in more complexity in terms of coordination of activities and strain in the budgets allocated for YieldWise Project activities.

3.2.2 Project Coverage Area

The main geographical regions of focus for the project included Ruvuma, Mbeya, Iringa in the Southern Zone; Dodoma in Central Zone; and Arusha, Manyara and Kilimanjaro in the Northern Zone. (See map below).

The role of AGRA and other implementing partners should be to act as facilitators and provide a platform for private sector to promote more sustainable GAPs, PHL management technologies, farmer aggregation models that respond to the needs of the market and supporting agro-dealers for input supply.
3.2.3 Embedding YWS Project Model in AGRA Consortia delivery model

Under the PIATA interventions, AGRA has been using an integrated approach in project management. A consortium of partners with relevant competences (production, extension, inputs delivery, market linkages, access to finance and policy framework) come together to
deliver a holistic suite of interventions to the stakeholders as shown below. The 5 objectives of YWS and lessons learned should be embedded in the projects to take PHL adoption to scale. Gaps identified in YWS should be improved in the consortium. To take YWS model beyond Tanzania and maize to scale in the 11 countries, partnerships with private sector and stakeholders in the value chains should be engaged. Post-harvest loss management should be extended to other value chains beyond maize to rice, sorghum, millet; pulses- beans, soybeans, pigeon peas, cowpeas, roots and tubers- cassava, potatoes. While countries are at different levels on post-harvest management strategies, the YWS model framework is relevant and impactful.

**Integrated Consortium Approach in project implementation**

![Integrated Approach to Agriculture](image)

In Tanzania, YWS model is already embedded in the consortia projects beyond the original project design zones into Kagera, Kigoma and Katavi/Rukwa with high impact in these areas, building on YWS lessons from the original project zones. A total of 470,016 farmers have been reached with training and post-harvest handling practices. The scaled up target including new zones was 600,000 farmers (with 200,000 to be reached by end of YWS project).

**Table 4: Number of farmers reached in PIATA Consortia**
<table>
<thead>
<tr>
<th>PIATA Project</th>
<th>Total number of farmers reached</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUKA Consortium</td>
<td>83,644</td>
<td>60,172</td>
<td>23,472</td>
</tr>
<tr>
<td>Ihemi Ludewa Consortium</td>
<td>95,651</td>
<td>62,173</td>
<td>33,478</td>
</tr>
<tr>
<td>Kagera Consortium</td>
<td>138,418</td>
<td>86,759</td>
<td>51,659</td>
</tr>
<tr>
<td>Kigoma Consortium</td>
<td>152,303</td>
<td>77,499</td>
<td>74,804</td>
</tr>
<tr>
<td>Total</td>
<td>470,016</td>
<td>286,603</td>
<td>183,413</td>
</tr>
</tbody>
</table>

Source: AGRA YieldWise report July to September 2019 to The Rockefeller Foundation

### 3.3 Opportunities

- YieldWise Project resulted in many significant successes in improving productivity and reducing PHL for farmers in Tanzania. A major opportunity that was observed is to take the small-scale successes in the YieldWise consortium and translate them into a coordinated plan for implementing widespread improvement and successes at scale. This has been demonstrated in Tanzania where YWS model has been embedded in PIATA consortium projects. This can also be replicated in other value chains such as rice, beans, sorghum, soya beans, pigeon peas and green grams.

- The private sector has a key role in getting better organized and pro-active at all levels. They can play a valuable role (currently led by civil society and donors) in pushing for inclusive improvement in the enabling environment for successful private sector led agribusiness models.

### 3.4 Overarching Lessons Learned

From the YieldWise Project, the following has been distilled for AGRA’s future development of Agricultural Value Chain projects:

1. **Off-takers or buyers must lead in FOs’ mobilization of any market led aggregation models**, participate in the design of any engagements or contracts with the farmers and inform on market volumes required by the market.

2. The role of AGRA and other implementing partners should be to act as facilitators and provide a platform for private sector to promote more sustainable GAPs, PHL management technologies, farmer aggregation models that respond to the needs of the market and supporting agro-dealers for input supply.

3. The maize value chain in Tanzania is highly competitive and characterized by the unpredictability of the markets and prices, unpredictable government policies on maize trade and generally lacking in produce quality premiums.
4. **Forward Delivery Contracts (FDCs)** was a new concept with majority of the farmers and other stakeholders in the project. Despite optimism about the potential of forward delivery contracts to improve access to reliable markets and inputs credit, contracts between farmers and buyers are difficult to enforce in case of a breach by either party. This is the scenario observed in the 2018 maize season in Tanzania. **Buyers failed to buy at the agreed floor price** citing market volatility and farmers in many FOs failed to deliver the agreed volume citing production challenges. Price fluctuations make it difficult for each party to stick to agreed terms. Enforcement of FDCs did not work for both parties involved; farmers and anchor buyers. Contract arrangements should be developed with sufficient incentives for FOs and off-takers to improve commitment and trust. For example a buyer or trader may provide working capital loans, advances or in-kind loans to farmers to ensure the timely delivery of produce. Their incentive to lend is not the profitability of the loan itself but securing the delivery of a promised good.

5. It possible to reduce food loss by expanding markets. In order to succeed at scale, crop aggregation requires an organized off-taker to invest in crop handling, storage and provide consistent timely payments to farmers on delivery of the crop. Future investments in maize value chain should focus on creating more opportunities for off-takers to invest in standard and large scale crop aggregation This vindicates the hypothesis put forward that market linkages will be a key lever towards reducing postharvest loss.

6. Financial products should be designed with **full engagement of the stakeholders**, be clearly articulated and transparent.

7. **To improve efficiency in agricultural value chains**, the **whole value chain must be considered holistically for sustainability**; and not just focus on one link in the system (in this case only PHL management was considered). All stakeholders must be involved through a participatory, inter-disciplinary and gender-sensitive approach in the activities from seed variety selection and cultivation, post-harvest, value addition, and marketing. In YieldWise Project, leveraging on the partnership of FtMA enhanced YieldWise Project outcomes as their entry led to the inclusion of GAP as a deliverable component of the project which was highly appreciated by the farmers.

8. **Engagement of appropriate national apex institutions** (research institutions, trade associations, civil society), government and private sector are essential in order to promote scaling up and replication of success. This requires the implementers of agricultural value chain initiatives to regularly step back from their specific value chains and engage with these institutions.
4.0 Analysis of Findings

YieldWise was designed to reduce post-harvest loss in maize by 50% and increase household income by 25%. The underpinning hypothesis was that if we create an enabling environment and link farmers to market, then farmers would see value of adopting technologies and practices that will reduce loss and increase their production. This would in turn lead to reduction of cost and increased revenues from selling more quality produce. A reliable market would also facilitate them to unlock finance for inputs through forward contracts.

4.1 Market Demand

4.1.1 Performance

As at July 2019, the project achieved aggregation of 224,334MT of maize of which 216,664MT was sold, equivalent of US$29,524,728. Only 4% was through forward delivery contracts (FDC) and 96% through alternative spot price buyers.

In YieldWise Project, there were two types of buyers that were involved in the project. Anchor buyers were buying produce through forward delivery contracts (FDCs) and alternative buyers that were not part of the FDCs who used spot market prices. FDCs did not work well due to price issues. YieldWise Project promoted contract farming arrangements with the objective of improving farmers’ access to reliable agricultural inputs and markets, including a floor price. Agreements were facilitated between off-takers and farmers and stipulated that inputs loan would be provided to farmers on the strength of the contract, to be repaid by the farmer at the time the crop is purchased by the off-taker. Farmers deposited 20% of input costs with the financial institution.

Farmers in return would commit to selling their crop to the contracting off-taker or processor. Despite some success, particularly with agro-dealers offering fertilizer, seeds and pesticides, this intervention failed to achieve a viable and scalable contract farming model in maize. The loan credit was a tripartite agreement between the farmers, anchor buyers and the bank. The FOs were the loan applicants from the bank. The bank paid agro-dealers directly for inputs supplied to farmers after they presented a pro-forma invoice to the bank. It was anticipated that WFP would be a buyer of last resort especially in situations where there were high surpluses, thereby stabilizing prices for the contracted farmers. This was the assumption of The support of the government, private sector and FOs can be enhanced by developing an ‘enabling environment’ to foster and regulate contract farming and help protect both FOs and off-takers so as to reduce the risk for both parties.
anchor off-takers who thought since WFP was coordinating the project and the markets function, it would off-take from them for its food aid requirements. Farmers also thought the same and this in some occasions made price negotiations difficult. **Both buyers and farmers had distorted information/wrong expectations about the role of WFP in FtMA.**

There was also misalignment of the project and WFP’s procurement system. WFP sources its supplies through a competitive tendering process and at the time the anchor buyers were engaged, none had a tender from WFP. Looking back, the project should have targeted to work with a mix of anchor buyers contracted by WFP not the other way round where the project decided to identify anchor buyers, engage them in the project and hope that WFP will take them on as their suppliers. Only pre-qualified suppliers, e.g. Musoma Foods, Export Trading Group (ETG) etc, received supply contracts from WFP.

The alternative buyers did not want to sign contracts because these were not enforceable. They opted for spot or market price which was not benefitting farmers as they could not access input loans without price contracts. According to the YWS report of July 2019, non FDC buyers bought 197,792MT of maize in 2018 representing 96% of the total sales, while FDC buyers bought 8,119MT (4% of sales). The table below illustrates the aggregated volumes and sales per YWS target regions for non-FDC buyers and FDC buyers:

**Table 5: Volumes Aggregated and Sold per region under FDC and Non FDC buyers**

<table>
<thead>
<tr>
<th>Regions</th>
<th>Non-FDC Buyers</th>
<th></th>
<th>Buyers With FDC</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total aggregation Volume (MT)</td>
<td>Total Sales Volume (MT)</td>
<td>Total Aggregation Volume (MT)</td>
<td>Total Sales Volume (MT)</td>
</tr>
<tr>
<td>Arusha</td>
<td>31,257</td>
<td>27,812</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Manyara</td>
<td>54,128</td>
<td>49,149</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kilimanjaro</td>
<td>18,295</td>
<td>16,700</td>
<td>49</td>
<td>0</td>
</tr>
<tr>
<td>Sub-Total Northern</td>
<td>103,680</td>
<td>93,661</td>
<td>119</td>
<td>70</td>
</tr>
<tr>
<td>Dodoma</td>
<td>15,692</td>
<td>14,977</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Singida</td>
<td>15,930</td>
<td>15,760</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sub-Total Central</td>
<td>31,622</td>
<td>30,737</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Iringa</td>
<td>6,778</td>
<td>6,070</td>
<td>27</td>
<td>0</td>
</tr>
<tr>
<td>Njombe</td>
<td>47,138</td>
<td>42,446</td>
<td>787</td>
<td>787</td>
</tr>
<tr>
<td>Mbeya</td>
<td>15,250</td>
<td>14,615</td>
<td>1,632</td>
<td>1,189</td>
</tr>
<tr>
<td>Ruvuma</td>
<td>10,533</td>
<td>10,263</td>
<td>5,779</td>
<td>5,348</td>
</tr>
<tr>
<td>Rukwa</td>
<td>-</td>
<td>-</td>
<td>3,273</td>
<td>725</td>
</tr>
<tr>
<td>Sub-Total Southern</td>
<td>79,699</td>
<td>73,394</td>
<td>11,498</td>
<td>8,049</td>
</tr>
<tr>
<td>Total</td>
<td>215,001</td>
<td>197,792</td>
<td>11,615</td>
<td>8,119</td>
</tr>
</tbody>
</table>

(Source: YieldWise Project report on Key Achievements - July 2019)
4.1.2 Challenges

YieldWise Project together with FtMA partners worked with farmers on maize quality to meet the needs of buyers, while also supporting maize millers to upgrade their equipment. Using improved GAPs, a strong market for improved seeds has been created as farmers have increasingly been made aware of the seed varieties that suit their agro-ecological zones. Despite interest from FOs and some buyers to develop quality graded maize markets, YieldWise was unsuccessful at establishing sufficient premiums to incentivize meaningful commitments and investments and develop niche markets for higher quality maize produce.

The result is that all maize is being purchased at more-or-less the same price and mixed together. In turn, insufficient price premiums are undermining efforts by farmers to raise quality. No incentive to improve produce quality beyond a minimum threshold. Some buyers like Real World Millers said they preferred buying from farmer aggregators who have been trained by YWS because they are assured of quality and it saves them time and the cost involved in cleaning before storage or milling at the factory. They said they are willing to pay premium price of between 5-10% of normal price for quality maize from these farmer organizations. (For details, see Appendix 4 annex 4.1). **However, the general maize trade is not quality based especially at farm-gate level.**

**Figure 2: Maize stored in an Aggregator’s Warehouse**

Maize traders who supply the millers and processors buy maize at 40-55,000 per 100 kg bag at farm gate. They sell at 80,000 wholesale price at Tandale market. The maize trader bears all the subsequent costs. Their main activities include networking with local assemblers, serving as a market outlet for farmers, and collecting and cleaning the maize grain before selling. Their main market is in Tandale Market in Dar es Salaam. Urban traders are also sources of bagging materials (sacks) used by farmers as well as market (price and volumes) information in their areas of operation.
Table 6: Transaction Costs by Maize Traders

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Units</th>
<th>Cost per unit (Tsh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase from Farmers</td>
<td>120-130kg bag</td>
<td>40,000 – 55,000</td>
</tr>
<tr>
<td>Loading</td>
<td>100kg bag</td>
<td>800</td>
</tr>
<tr>
<td>Transport</td>
<td>100kg bag</td>
<td>1000</td>
</tr>
<tr>
<td>Offloading</td>
<td>100kg bag</td>
<td>800</td>
</tr>
<tr>
<td>Transportation Levies</td>
<td>100kg bag</td>
<td>2500</td>
</tr>
<tr>
<td>Total costs</td>
<td>100kg bag</td>
<td>45,100- 60,100</td>
</tr>
<tr>
<td>Selling price at Tandale Market</td>
<td>100kg bag</td>
<td>80,000</td>
</tr>
<tr>
<td>Gross margin</td>
<td>100kg bag</td>
<td>36%</td>
</tr>
</tbody>
</table>

Farmer’s forward contracts with the buyers/Off-takers that were managed by FtMA were not fully enforced thus some of them were not successful. When the project began in 2016, the Forward Contracts that were signed between farmers and the off-takers worked well for the 2016/17 harvest season. The markets were good and most farmers with forward contracts were able to aggregate for off-takers and pay their bank loans.

In 2017/18 farming season, there was a drop in the prices of maize. This was due to the bumper harvest that was realized and the government ban on export of maize. This adversely affected aggregation and sale of maize by farmers through the FDCs. Some off-takers and buyers opted to buy maize at the market price which was lower than the forward contract price. Some FOs were persuaded to negotiate the prices downward in order to sell quickly and avoid losing all the produce to damage by weather and pests like weevils and rodents, thereby incurring further losses.

Also FOs did not have proper maize storage facilities to store their maize to await possible price improvement (arbitrage). The market prices dropped to as low as between Tsh. 180 per kg to Tsh 240 per kg ((approx. US$80-107 /MT) while the FDC price was set at between Tsh.420 per kg to Tsh450 per kg (US$187- 200/MT) . Farmers made losses and this affected the production of maize for the 2018/19 season. Some FOs were not able to fully pay their loans with the banks (with penalties loaded on their loans and therefore have not been able to access input credit for this season (2019/2020). The harvest was poor this season in some maize growing regions in Tanzania due to weather conditions. Current maize prices are as high as Tsh 750 /kg to Tsh 900 /kg (US$329- 395/MT) in Kiteto. This is collaborated by maize market prices from Regional Agricultural Trade Information Network (RATIN) (www.ratin.net ) and Famine Early Warning Systems Network (FEWS NET).
4.1.3 Opportunities

The introduction of GAP, which was not initially in the project design, significantly improved farmer productivity by 2 – 3 times from 5 - 8 bags (500 - 800kgs) to between 15 – 25 bags (1.5 – 2.5 MT per acre). This high productivity spurred increase in sales of maize by farmers. In addition, forward contracts that were signed between farmers and buyers or off-takers, a first for many FOs and farmers contributed to the increase in productivity since the contracts enabled farmers to access input loans from financial institutions using the forward contracts as guarantee for loans. The project raised the profile of FOs and aggregators by building their capacity to access better markets and negotiate contracts with buyers and access finance. Some off-takers like Ruaha Milling Company, Real World Ltd and MEMA Holdings have continued engaging FOs that were trained through YieldWise Project because they are assured of quality maize, and volumes that they require.

On the other hand, with increased productivity, insufficient and low quality storage is a constraint to efficient maize marketing and enforcement of forward contracts. Opportunities still exist for considerable expansion of storage capacity especially for FOs at the primary aggregation centers so that they can be able to aggregate more maize from farmers. Aggregation presents several cost saving opportunities for buyers, including reducing logistical costs of sourcing output from smallholder farmers and guaranteed quality. However, long term commodity storage should be undertaken by the private sector (SMEs/processors)

Changing the way farmers operate, building skills and understanding about the market takes time. There is a big potential to get small-holder farmers’ organizations get better organized and more effective in the market through improving their entrepreneurial skills; internal governance, discipline; and organizational capacity to be effective and have a critical mass that can attract buyers and off-takers.

4.1.4 Lessons Learnt

The following lessons have been distilled from the above findings:

1. Produce off-takers/processors are very critical for aggregation, given their capacity and incentives to invest in storage. They are willing to buy from farmer aggregators because they can be able to meet their need for volumes and quality maize. However, farmers’ willingness to aggregate produce without an assured buyer was low.

2. Farmers engage in side-selling primarily as a result of purchasing delays by contracted buyers. Cash starved farmers are impatient and risk averse, so sell to the first buyer when the contract buyer is unavailable, particularly when market prices are not stable and farmers fear to hold or aggregate produce;
3. AGRA can catalyze change by supporting a critical mass of producers to upgrade pre and post-harvest practices and aggregation. Buyers should be committed to a meaningful premium price and embedding services that help producers comply in the long term. Establishing a stable maize market and enforcement of contracts requires a dual commitment from FOs and the buyer, to meet agreed volume and quality requirements of buyers and off-take volumes and price premiums for producers;

4. The provision of high quality inputs (seed and fertilizers) as part of a contract farming scheme can be a major win-win, enhancing producer loyalty as well as crop yields and produce quality;

5. The support of the government, private sector and FOs can be enhanced by an enabling environment to foster and regulate contract farming and help protect both FOs and off-takers so as to reduce the risk for both parties;

6. Unpredictable government policies, especially export bans and price setting for produce based on arbitrary price perceptions is a major deterrent to FDCs

7. AGRA and its partners can help generate loyalty between the off-takers and FOs by facilitating transparent contracts and communication channels and monitoring the relationship.

4.2 Farmer aggregation and training (supply side)

4.2.1 Performance

YieldWise Project helped over 107,322 farmers in Tanzania double their yields from between 5 – 8 bags (500-800kgs) to between 15 – 25 bags (1,500-2,500 kgs) of maize per acre with the aim to both increase food security and create additional cash income through market linkages. The project promoted improved post-harvest handling and aggregation and collective storage for FOs. Farmers were supported with training in GAP and Post-harvest loss management and supplied with post-harvest handling equipment (PHH) such as moisture meters, weighing scales, tarpaulins and metal silos.
YieldWise also worked with maize millers and Agricultural Marketing Cooperative Societies (AMCOS) to promote provision of storage services to FOs. Millers/processors/aggregators accessed a matching grant facility through the project that is enabling them to increase their storage capacity and hence accommodate increased production from farmers. One of the new YieldWise buyers, MEMA Holdings, has started construction of storage facility with planned capacity of 2,000MT of maize in Kiteto, Manyara Region, Northern Tanzania. The long-term plan is to extend the storage/handling and cleaning facility to 10,000MT. Other off-takers such as Real World Ltd and Mama Seki millers are also in the process of acquiring metal silos with capacity of 1,000MT of maize each in Songea, Southern zone. This will go a long way in increasing off-take of farmers’ produce and reducing PHL at farmer and aggregator levels through improved cleaning, drying and storage facilities.

In partnership with FtMA, farmers were facilitated to access US$ 559,319 in input loans for the 2018/2019 planting cycle, making a cumulative total of US$3.1M in input loans accessed since 2017 (YWS Key Achievement Report of July 2019). Unfortunately, this harvest season (2018/19), there was a significant decrease in yields due to unusually poor weather. Also the export ban by the Government in the 2017/18 led to farmers making losses as maize prices collapsed. The farmers were not able to invest in inputs, thereby undoing project gains from previous years. However, many FOs continue to function and collectively store and sell maize surpluses, and increasingly a mix of other crops. Some have also started undertaking more diverse collective business activities including value addition (maize milling, rice processing and sunflower growing).
The project worked with 214 Farmer Organizations (FOs) in the focus regions of the project. FOs have a significant presence in their communities and if strengthened they can be used to expand agriculture services across the regions. Most of the FOs and AMCOs visited own offices and warehouses (100-300MT); while some were in the process of acquiring tractors and lorries that they were planning to use to provide land preparation and transportation services to their members and other farmers in their area for a fee. Key services that these FOs and AMCOs provide to farmers was input order aggregation and supply, but also storage services, provision of market information, tractor hire services and the more pro-active, marketing of maize as well as marketing of a wider range of crops such as beans, sunflower and rice paddy.

YieldWise through their partners, RUDI and BRITEN spent three years supporting these FOs and AMCOs, with the objective that successful changes could be replicated more widely in future. Support included training on GAP, PHL Management, farming as a business, contract farming and collective marketing. The trained farmers acquired skills in business that has enabled them to improve bargaining power when conducting business with buyers.

Farmer field days were also conducted in collaboration with inputs supply companies which included: Seedco, Meru Agro, Yara Tanzania, ETG, Silverland, and Kibo trading. In attendance during the field days were Government officers including District Agriculture, Irrigation and Livestock Cooperatives Officer (DAICOs), District Inputs Officer, Ward Agricultural Extension Officer, Village Executive Officer, and Farmers. The field days were used as a platform to bring public and private sector together with the farmers to demonstrate and promote new technologies, get feedback from farmers, and mutual business relationships with the farmers.

Through YieldWise, there was expanded adoption of post-harvest technology where farmers bought 92,906 hermetic bags, 672 silos and 11,134 tarpaulins through the promotions organized by the project. The project was able to introduce farmers to 171 Agro dealers that are selling post-harvest technologies and other farm inputs.
4.2.2 Challenges

In an effort to optimize their participation in the marketing system through pro-active marketing and improved negotiation; FOs were linked to anchor buyers or off-takers for purchase of their members’ produce through forward contracts. The FDCs worked well for farmers when the market prices were stable and higher than contract prices. The FDC stipulated that if the market price is higher than the contract price, the parties can negotiate for a higher price and if market price is lower than contract floor price, the off-taker will pay the contract price.

This was the biggest challenge to FDCs. Off-takers either delayed collection or totally defaulted in off-taking the produce when market price was lower than contract floor price. Farmers who had used their forward contracts to get input loans from banks could not service them using the proceeds from sale of their produce. Some of them had to look for alternative ways to get funds to pay for the loans; while other FOs were forced to pay bank penalties for defaulting on payment. (Annex 9.1)

In other areas, like Manyara in the Northern Zone, there was drought that caused a total crop failure. The guarantee scheme that the project had negotiated with Private Agriculture Sector Support (PASS) covered only 60% of production inputs. This covered input suppliers but not the

“Before the training on GAP, I used to get only 8 bags per acre; but now after the training, I get between 16 bags to 20 bags per acre. The training in Post-Harvest Management and the technologies that were introduced like the PICs bags have helped us to reduce post-harvest losses for our household food. Even our neighbours who were not trained come to see how we are using the bags”.

Adelaide Dalu – Pictured on the left.

Kiponzelo SACCOS in Iringa
farmers. Insurance schemes that were introduced to farmers through the project were not communicated properly to them and farmers did not understand how they worked. (Annex 9.5).

There is a high demand for thresher, tractors and transport service providers among all groups visited. Due to higher productivity, manual shelling (beating maize in bags) is too tedious and expensive.

### 4.2.3 Opportunities

The use of hermetic bags has drastically reduced PHL at household level due to the fact that farmers prefer them for storing their maize and beans for domestic use. Farmers said they don’t use chemicals during storage since hermetic bags are effective. They indicated that the triple layer PICs bags and the single layer A-Z bags were equally effective in grain storage. Generally, Post-harvest losses have reduced from 30% to 12-15%. The loss is still highest at storage before sale of produce. Equally maize yield has increased from 5-7 100kg bags per acre to 15–25 100kg bags per acre. Farmers are now using improved seed and fertilizer and are practicing GAP.

Through forward delivery contracts, farmers are able to get better markets and prices for their produce; and access input loans that have helped them increase their productivity. Mechanisms to reduce risks for off-takers and farmers in FDC should be explored. The demand for extension services and technologies by farmers has also increased. There is the need to increase the number of last mile agro-dealers for some regions in the northern zone like Kiteto that have limited number of agro-dealers or the ones available do not stock post-harvest technologies (Annex 9.5 and 9.6).

Although high quality extension advice is available from well-established international and national companies, only those who can afford their products or services access it. More is need to provide business development skills to farmers and local agribusinesses by developing the capacity of local NGOs like CSDI, RUDI and BRITEN and small companies and Agro-dealers providing these services, especially to farmers.

Apex organizations such as research institutions, non-state actors and civil society that represent the interest of farmers do not yet represent or speak for the majority of Tanzanian small scale farmers, as was stated by some members of FOs in FGDs. The potential for an apex organization that will pull together public and private sector partnership, develop value chains, coordinate public and private sector financing, and achieve a critical mass of commercial agriculture and agribusiness still exists.

### 4.2.4 Lessons Learnt

The following lessons have been distilled from the findings on the component of farmer training and aggregation:
1. Farmers aggregating stocks were able to get good prices for their produce. YieldWise project trained them in PHL management and introduced new PHH technologies that enabled them to prepare quality grain that is attracting off-takers and processors;

2. YieldWise stimulated the demand for inputs and post-harvest technologies from Agro-dealers through parallel interventions of training on Good Agricultural Practices (GAP) and PHL that enhanced demand and Agricultural extension services. Most participants said the price of hermetic bags is still high (between Tsh.4,500 to Tsh.5,000) (US$2-2.20 per bag) and therefore prohibits uptake by many farmers; It is worth noting that farmers are aware of the benefits and effectiveness of hermetic bags, and only use them for home food reserve storage, but when they compare with polypropylene bags at Tsh.800 a piece, the hermetic bags appear exorbitant. This concern was voiced by all participating farmers.

3. AMCOS need to become more entrepreneurial, diversify their services, develop income generating activities such as agro shops, rely less on bank loans, and improve customer service;

4. Strong leadership is critical for the success of FOs and AMCOs. For FOs that are diversifying into value addition, they need to hire a professional manager to help them manage and grow the business arm of the group and develop new revenue streams (Annex 9.7 and 9.8);

5. Maize is particularly vulnerable to price fluctuations given its reliance on regional trade and price interventions by the government. Unpredictable price fluctuations significantly deter storage and contract enforcement, and farmers are forced to side-sell for fear of prices dropping;

6. Un-anticipated export ban (in 2017/18) negatively impacted farmers, thereby impacting longer term planning by farmers. This should inform policy dialogue;

7. FOs should add other high value crops (e.g pulses) to attract additional membership and diversify risk, which many groups did on their own following the 2017-18 season;

8. There is an urgent need to develop crop insurance products with reputable companies (Annex 9.5). Farmer knowledge in this area is very limited

4.3 Access to finance

4.3.1 Performance

Farmers in Tanzania, like in most African countries, have limited access to financial services. This constrains their ability to make productivity enhancing investment, to use technology and
services, and to reduce risks. Provision of loans to agriculture is largely constrained by the high transaction costs of serving clients located in remote, less densely populated areas with limited infrastructure; high risks in agriculture (including weather, price, pests and diseases); lack of collateral especially for smallholder farmers; and inadequate information on credit history. Many financial institutions are hardly present in rural agricultural areas and provide limited types of products.

As part of its intervention, YieldWise provided funds to support financing of Post-harvest technologies to Agro-dealers, aggregators and off-takers in the focus project regions. The project involved three banks in the management and disbursement of these funds including Tanzania Agriculture Development Bank (TADB), Tanzania Post Bank (TPB) and Equity Bank. TADB was to establish a matching fund for off-takers and processors to improve off-take and increase their processing capacity, reduce post-harvest losses at processing/aggregation level and buy more from farmers. TPB and Equity Bank were to operate a revolving fund for SMEs to access loans for post-harvest technologies including hermetic bags, silos, cocoons and fabrication of metal silos.

Equity Bank was the first financial provider partner in YieldWise project. The bank signed a contract for one and a half years in 2016 and received USD 200,000 fund for post-harvest technologies loans. The bank was required to provide a matching amount (US$200,000) to reach a fund of $400,000.

The fund did not perform well because the product was still very new to the bank staff and potential customers. Equity Bank’s coverage in Tanzania was also lean and they were supposed to reach farmers in regions and areas where the bank did not have presence. The bank operated only within 100 km radius from their branches (only in major cities). To improve product knowledge and outreach, B2B meetings, training and awareness was undertaken by the project, Agro-dealers came to know about the loan product and the technologies supported. In 2017, the bank signed a new contract after the expiry of the first one. In the new contract, AGRA added Equity Bank USD 200,000 making a total of US$400,000 from the project with Equity adding an equal amount to make a fund of USD 800,000. Equity Bank has been able to disburse only USD 261,000.

<table>
<thead>
<tr>
<th>Status of revolving loan funds under Equity Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total applications received</td>
</tr>
<tr>
<td>40</td>
</tr>
</tbody>
</table>

*Source: Equity Bank Q2 2019 Report*
TPB on the other hand signed a contract with AGRA in May 2018 and received USD 200,000 in June, 2018. The funds were received when the harvest had already started making it difficult for uptake of the loans by the SMEs. The agro-dealers were also not willing to take the loan for post-harvest technology only because they were going to make losses if they take a loan and factor in the cost of interest (at 17% reducing balance). They wanted the loan to be split 50:50 for PH technology and other input products to address margin issues and seasonality of PH technology products. AGRA agreed to this new arrangement but did not formalize it through contract amendment, raising audit questions for the banks from AGRA Auditors.

Agro-dealers further requested for a 30:70 split for PHL technologies and other products which the bank has requested for AGRA approval. Through Credit Reference Bureau (CRB), it was found that many of the agro-dealers were also loan defaulters in other financial institutions and therefore were disqualified by appraisal officers. In both cases (TPB and Equity Bank), 50% of the loan is remitted direct to the technology supplier or the manufacturer on submission of proforma invoice. The other 50% is left in the account of the agro-dealer for use depending on need for other inputs.

<table>
<thead>
<tr>
<th>Table 8: Status of Revolving Fund Under TPB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status of revolving loan funds under Tanzania Postal Bank (TPB)</td>
</tr>
<tr>
<td>Product</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Hermetic bags</td>
</tr>
<tr>
<td>Metal silos</td>
</tr>
<tr>
<td>Cocoons</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Source: TPB Bank Q2 2019 Report

Through these two financial institutions, the project facilitated SMEs access to finance and according to the project’s key achievements report as at July 2019, a cumulative total of US$ 290,086 had been disbursed to 41 SMEs (mainly agro-dealers).

TADB came in the project after changes were made on the criteria for funding. Two banks were involved during contract review: National Micro-Finance Bank (NMB) for working capital and TADB for capital expenditure (CAPEX). This is because TADB’s investment funding takes a CAPEX term of 5 years while NMB’s was 3 years. NMB was to later pull out of the contract negotiations.

Before the contract was signed, there was a restructuring by AGRA and the requirements were that the bank will finance processing machines with a capacity of 30MT per 8 hours and storage equipment with capacity of between 500MT and 1000MT. The SME’s had to be in business for a minimum of 3 years – no start-ups were to be funded. TADB was to support the facility with 70% CAPEX term loan; with SMEs equity contribution at 30% in cash or in kind; then qualify for AGRA’s...
matching grant of 30% of CAPEX (100%) which is equal to USD 80,000 for silos and USD 40,000 for machinery.

TADB signed the contract with AGRA in January 2019 and received USD 610,000 whereby USD 30,000 was meant for consultancy services to review proposed equipment investment and the balance of USD 580,000 was available for borrowing and operationalization of the grant. Any interest that accrues on the funds is paid to AGRA but no administration costs were factored in. The cost of the loan from TADB is between 12%-15% minimum with a maximum of 17%.

The bank has so far provided two (2) loans worth US$436,139 to 2 SMEs for the purpose of purchasing steel silos and milling machines. This facility is picking up very fast with rich pipeline of other off-takers and processors whose loan processing is at an advanced stage, totaling close to US$6.8 million which is more than ten times funds from AGRA.

Table 9: Status of TADB - AGRA Matching Grants

<table>
<thead>
<tr>
<th>Name of product</th>
<th># of loan applications</th>
<th>Value of loans requested (USD)</th>
<th>No. Of loans approved</th>
<th>Amount of loans (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel Silos</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Milling Machines</td>
<td>1</td>
<td>231,653</td>
<td>1</td>
<td>176,502</td>
</tr>
<tr>
<td>Silos and Milling Machines</td>
<td>1</td>
<td>351,560</td>
<td>1</td>
<td>259,637</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
<td><strong>583,213</strong></td>
<td><strong>2</strong></td>
<td><strong>436,139</strong></td>
</tr>
</tbody>
</table>

Source: TADB Q2 2019 Report

4.3.2 Challenges

The revolving fund contract between the banks (TPB and Equity Bank) and AGRA was restricted to financing PHL technology – Hermetic bags, silos, cocoons and tarpaulins. This proved to be a hard product for banks to sell to their customers given that demand for most of the PHL technologies is seasonal and it is dependent on the period when the farmers are harvesting. The agro-dealers interviewed were of the opinion that the loan product should include other inputs to cushion them against holding dead stock and tying their working capital. They also wanted the loan facility to finance other technologies that had the potential of reducing PHL including threshers, artisans fabricating post-harvest technologies, tractors, among others. Banks felt that they were not given the opportunity to operate their businesses flexibly - the ceiling for lending was at Tsh30M then increased to Tsh50M (approx. US$13,600 - 22,700) but the demand by agro-dealers was for higher loan amounts.

The other challenge was the interference of government in the agriculture sector through export bans and high taxes imposed on some of the technologies like cocoons (25% duty and 18% VAT)
resulting in high prices that are prohibitive for farmers and users to purchase. The other challenge that requires policy dialogue is the regulations for risk asset management that addresses issues in normal lending and not specific to agriculture and related businesses; which has high risks including unpredictable weather, price fluctuations, pests and diseases among others.

For Equity Bank, they were limited in geographical coverage. The project covers regions where Equity had no presence or branches. At the time, the bank had only branches in big cities in Tanzania and farmers were coming from small rural towns. Marketing costs and risks were to be taken by the banks and due to the distances covered; it took a long time to market and create awareness of the loan products. At the end, the task of marketing the loan products was left to YieldWise Project partners (RUDI and BRITEN), who were not part of the contract negotiation between the banks and AGRA, and this may have led to unclear/wrong perception by customers that this would be a grant coming from NGOs.

Some of the Agro-dealers interviewed complained that the payment period provided for the loans is short. They are given 6 months to pay (equal monthly installments), while the interest charged is between 18% - 25% in some banks. According to the agro-dealers, banks have stringent rules and regulations that do not attract borrowers, especially SMEs. The type and level of collateral required was beyond most SMEs (title deeds of residential property in towns). There is therefore the need for the banks to develop loan products that are suited to the needs of agro-dealers and the nature of their businesses- (seasonality).

TADB had a challenge in the operationalization of the grant. TADB had to open a separate account in the joint name of AGRA and TADB where all grant funds were deposited. A separate account was opened by the bank and was attached to the SME loan account which was in a different bank – Tanzania Investment Bank (TIB). Borrowers are asked to open accounts with TIB because TADB does not run operational accounts. TADB has already disbursed loans to Mama Seki and Real World Ltd amounting to USD 62,000 for two milling machines that are being fabricated in Tanzania and a further USD58,560 to Real World’s metal silos that are being imported from China. A total of USD351,560 was approved for Real World Ltd.

Off-takers and processors delayed in putting together documentation that is required for loan appraisal by the bank. Documents such as certification from National Environment Management Commission; building permits from government and National Construction Authority (NCA); proforma invoices from suppliers etc are required for the loan to be approved. The ability of SMEs to put together this documentation required by the bank is mismatched. Also the processors have limited capacity to write fundable business plans and therefore have to outsource for this service which takes time and resources. There is need for a technical assistance (TA) fund to assist SMEs put together loan proposals and business plans for quick processing of the loans.
4.3.3 Opportunities

A constant concern for most farmers and SMEs during the study was access to affordable finance. Commercial banks have been reluctant to lend money for maize production especially to small scale farmers. The potential of developing financing models that combine use of maize as collateral, off-taker loan guarantee and value chain financing to reduce the risk of lending to small scale farmers is evident.

The banks that were involved in YieldWise Project affirmed that through the Project, they were able to increase engagement with Agribusinesses and other key stakeholders in the value chain including farmers, agro-dealers, buyers, off-takers, processors and insurance companies among others. For instance, TPB has increased its Agribusiness portfolio to US$1.5million which is equivalent to Tsh.3Billion (Annex 8.1). The project provided a platform for the banks to create awareness for other bank products that are beneficial to agri-businesses e.g., term loans, overdrafts, invoice discounting, letters of credit, bank guarantees and bid bonds. Some banks were able to expand to other regions where they did not have a presence.

A key finding that will have big implication to this initiative is the fact that banks have little in-house technical capacity to assess and develop agriculture investment products. This was evident from the length of time it took to get the three banks (EBT, TPB and TADB) to roll out their loan products in the market. Therefore, opportunity for facilitators such as AGRA exists to work with the banks and help them develop their internal capacity to develop agro-financing products that can suit small scale farmers and other agri-businesses.

4.3.4 Lessons Learned

Some of the lessons that were distilled in this component include the following:

1. Working with and choice of local financial institutions that are close to farmers is a good catalyst for partnership and ownership of the financing model;

2. Restructure the agreement between TADB and AGRA to make it flexible and accommodate reality on the ground. Loan products should be designed according to needs of the market and in collaboration with the target customers;

3. YieldWise Project matching grant and revolving fund model can be used by the banks as a proof of concept and if successful the bank will scale it up without the need for further support. The banks should therefore be allowed to use the grants given to them for a longer period of time instead of term contracts of 1 – 2 years.

4. Equipment/processing machinery capacity should not be pegged to output capacity volumes that processors cannot meet/manager, e.g. processing capacity should be based...
on production output per hour and not in 8 hours. Most SMEs were at 40-60MT/24 hrs, e.g. Union Stores. The market share and the working capital required is a key determinant in capex investments.

4.4 Scale up adoption of Postharvest Handling technologies

4.4.1 Performance

AGRA’s YieldWise Project trained farmers and aggregators on how to use improved post-harvest handling methods, use of hermetic metal and plastic silos, combined with simple to use but effective hermetic storage bags which are both air and water tight, helping to guard against insects, mold, and moisture. Participating farmers have so far been able to reduce post-harvest losses by up to 50%. Thanks to improved grain quality and the ability to hold on to their produce until prices rise during the lean season, they have managed to improve food security and incomes.

Properly used hermetic household storage units increased food availability at the household level, and enabled farmers to control timing of crop sales, improving household income. So far, 107,322 farmers participated in the YieldWise Project helping them save more food and sell more of their surplus in local markets.

The involvement of technology distribution companies helped in the promotion, training and establishment of distribution channels for technology and thus faster adoption by farmers. The companies include Pee Pee Tanzania Limited (PPTL) for PICS bags; AtoZ for Agro Z bags and tarpaulins; and GrainPro for Super bag and cocoons and Zero Fly bags from Vestergaard. Other companies that were involved in the promotion and distribution of technologies are HELVETAS for metal silos, WFP which brought in hermetic plastic silos from Uganda, manufactured by Smileplast, Intermec Engineering Ltd for metal silos and dryers from Morogoro, and Cimbria who are manufacturers and suppliers of PHH technologies from Kenya. HELVETAS trained local artisans to fabricate metal silos.

The project has also been able to advocate the government and other stakeholders in Agriculture in Tanzania on issues related to PHL through engagements at different levels. YieldWise Project collaborated in the development of the National Post Harvest Management Strategy for Tanzania that was launched in August 2019. 2000 copies of the strategy document have been published in English and 10,000 in Kiswahili copies of popular version, supported by the project.

4.4.2 Challenges

YieldWise focused only on maize value chain for scale up; most participants proposed the need to diversify to other crops such as beans, soy beans, pigeon pea, green grams and other legumes (Annex 3.2). In future also, diversification to other cereal products (rice, sorghum, millet)
and animal feed should be put into consideration to increase uptake of PH technologies that were introduced in the project.

Farmers are happy with the effectiveness of the PH technologies promoted. Most of them agreed that technologies such as hermetic bags and silos worked well since they are able to store their produce for a long period of time without being infested by pests and without use of chemical pesticides. Silos had the added advantage of protecting the produce from rodents and rats. They preferred plastic silos to metal silos because of ease of use and can be used for other purposes including water storage, and can be kept inside their houses while metal silos have to be kept outside. Unfortunately, the plastic silos are not available in the local market. They are imported from Uganda and the price of Tsh250,000 (US$110)\(^2\) is too high for farmers. If manufactured locally, they may be affordable to farmers. A big opportunity exists for local manufacturing. AGRA should explore if Agro Z or PPTL could manufacture them.

The distribution of PH technologies has not reached many of the regions in Tanzania. Farmers said that although they are aware of the technologies after being trained by YieldWise Project, they still cannot get the technologies from the local agro-dealers. Some FOs, especially in Kiteto, are willing to act as agents for the manufacturers and distributors by consolidating orders from farmers so that they can be able to get at discounted prices from manufacturers or distributors. Farmers buy hermetic bags at between Tsh4,500 to Tsh5,000 and if they were to buy direct from manufacturers they can get then at Tsh3600. A to Z said they are open to such arrangement with the farmers so long as they are able to order the required quantities.

The other issue that was raised that can be prohibitive in the adoption of PH technologies is the high price of these new technologies. This can be attributed to the Government’s taxation policy that still imposes taxes on some of the PH technologies or the materials used to manufacture them. High tax affects affordability. Although the government has waived taxes on some technologies, like hermetic bags, the tax on metal silos is too high since the materials are imported in the form of iron sheets. A local levy, (cess) of between 3% - 5% of the market price of maize is charged by the local government on produce being transported to the market. Farmers end up shouldering this cost as traders pass it over to them when negotiating for prices. The government does not charge cess on 10 bags and below but some participants in this study claimed that multiple cess is charged when the produce is being moved from one region to the other. Other costs that farmers have to bear include roads levy that is imposed by Tanzania Rural Roads Authority (TARURA) for permits or licenses when heavy trucks and lorries (above 10MT) are using feeder roads.

\(^2\) US$1 = Tsh2250
The Tanzanian government in collaboration with the Polish government is in the process of constructing and installing metal silos at NFRA depot in Songea District and other high maize producing areas with a capacity of 50,000MT that can also clean and dry grain. NFRA provided training and awareness on PH management and quality requirements to farmers whom they buy from. Through the YWS project, NFRA depots in Songea and Dodoma, and the maize market at Kibaigwa, were provided with cocoons with capacity of 525MT, 150MT and 50MT, respectively, to demonstrate their effectiveness to store maize and mitigate post-harvest losses. The cost of cocoons is prohibitive due to high duties and taxes (25% duty and 18% VAT). cocoons cost about 1.5 times the price in Kenya.

**4.4.3 Opportunities**

Through the project, technology manufacturers and distributors were mobilized and 4 brands of hermetic bags are still in the market including PICS bags, Agro Z, Zero fly, and Super bag (Grain Pro). Other technologies like use of cocoon, metal and plastic silos, and tarpaulins were also promoted through YieldWise project.

New manufacturers also came on board, leveraging the YWS project and promoted their products; (PPTL – Tanga, PICs bags and tarpaulins), A2Z Arusha -Agro Z bags and tarpaulin), (Intermec Engineering Ltd- Morogoro Metal Silos and Maize driers), Helvetas -training of artisans to fabricate metal silos), Grain Pro (Distributors/ importers of cocoons and super bags), and Cimbria (silos). There is the need to explore outsourcing storage facilities through private sector investors. A big opportunity exists for local manufacturing of plastic silos that the farmers prefer. AGRA should explore if Agro Z or PPTL could manufacture them.

The suppliers of the technologies also participated in the promotion and distribution of the technologies and in establishing distribution channels close to the farmers, mainly agro-dealers. Mechanization is little used at the moment due to unavailability of the services, but has the potential to increase efficiency of maize production in Tanzania. Opportunity exists for expansion of private sector led mechanization service provision like tractors for land preparation, threshing services, and transportation; which farmers said is lacking in many regions and are in high demand.

There are other private sector companies that are already investing in PH technologies on large scale. MEMA Holding is constructing a storage facility with planned capacity of 2,000MT of maize in Kiteto, Manyara Region, Northern Tanzania. The long-term plan is to extend the storage/handling and cleaning facility to 10,000MT. Other off-takers and processors such as Real World Ltd and Mama Seki have already taken advantage of YieldWise financing scheme with the banks to expand their processing and storage capacities.
The project collaborated in the development of the National Post Harvest Management Strategy that was launched by the government recently.

**4.4.4 Lessons Learnt**

The following lessons have been extracted from this component in the study:

1. Exit strategy should be part of the project design. As a facilitator, AGRA should enhance collaboration between the government extension officers and project implementers for sustainability of the projects. NGO activities should be harmonized through consultative forums that bring together all stakeholders in the value chain.

2. The metal gauge that was being used on metal silos was said to be of low quality and therefore was not preferred by farmers as the silos got dented easily.

3. Farmer awareness and adoption of technology is high. Farmers said they are now well trained in GAP and PHH and loss management. These technologies are an expanded product line for agro-dealers.

4. Manufacturers and distributors of PHTs took PH issues seriously and took ownership on technology marketing and distribution. A to Z invested in a Liner-Machine that combines 5 layers into one at a cost of USD500, 000. In total the company has invested USD 600,000 including marketing and distribution costs. The machine can produce 200,000 bags in one day and is only utilized at 5% of the time.

5. It is possible to distribute PH technologies through FOs and/or AMCOs if they consolidate their orders to reach the threshold volumes required by distributors or manufacturers.

6. Some off-takers have started value chain financing where they provide inputs to farmers that were trained by YieldWise Project. Farmers are required to pay 50% of the inputs cost upfront to the supplier, mainly fertilizer, while the balance, without interest, is cleared after harvest when the produce is delivered to the off-taker. The processor/off-taker is the guarantor for these inputs. AGRA should evaluate the potential/acceptance of the value chain finance model being promoted in Burkina Faso, where all stakeholders share in the risk (farmers, agro-dealers, off-takers/processors).

7. Regional trade boosts farmers’ income and should be open with predictive policies.
4.5 Prioritization of PH loss prevention and Knowledge management

4.5.1 Performance

The farmers who participated in this study acknowledged that PH losses begin on the farm; pre-harvest, at harvesting, or infested by insect pests, or dampened during unseasonal rains resulting in mold growth. They said that the choice of seed varieties is critical to avoid those varieties that remain upright after they mature and open at the top leading to the maize cobs to start rotting after absorbing water. Varieties such as SeedCo 614, Pannar 625, Kibo 628, SeedCO 719 and Chapa Tembo were singled out by farmers as those that rot at the top. Preference was for Meru Agro 513.

Other areas where PH losses occur included during transportation from the farm; during sun-drying – poor weather may lead to insufficient drying and high losses, or roaming livestock may consume portions of drying grains left unguarded; poor handling during threshing, shelling or further drying can lead to scattering, contamination with soil and stones, and grain breakage. The highest losses occur during storage due to poor storage hygiene and infestation by pests and rodents.

4.5.2 Challenges

Storage infrastructure is the most significant challenge for cereal farmers in Tanzania, as more than 50% of the losses occur at this stage. Most FOs and AMCOs have started constructing offices that comprise of a warehouse where they can store their grain. This is being done through the contribution of members and also through collaboration with donors such as Iringa Hope Foundation that has constructed offices and stores for Ihemi and Kiponzelo SACCOs in Iringa and KAWAMA SACCOs in Madaba. The government is partnering with the government of Poland to construct metal silos in NFRA depot in Songea and other NFRA depots in high production areas. These come with cleaners and dryers. Songea NFRA is putting up 50,000MT silos.

Use of Aflasafe: A to Z manufacturer of Agro Z hermetic bags, has been granted the contract to produce, promote and market Aflasafe in Tanzania, as an added mitigation to aflatoxin contamination in grain and pulses. Aflatoxin contaminated produce is condemned for use for humans and animals, thereby contribution to post-harvest losses and incomes for farmers. A to Z proposes to collaborate with AGRA in getting Aflasafe to farmers in consortia supported by AGRA. They plan to leverage the distribution channels established under YWS in hermetic bags delivery for the distribution of Aflasafe.

YieldWise Project prioritized storage by incorporating a financing facility through local banks for PH technologies for farmers and off-takers or processors. This facility was a matching grant and has been explained fully in the access to finance section in this report.
4.5.3 Opportunities

Primary aggregation for collective marketing is critical. FOs and AMCOS are providing this. With increased productivity, this role should be managed by the private sector.

Contamination of grain with aflatoxin is a major concern. Investment in Aflasafe, awareness creation, promotion and distribution through the PHL established channels should be a priority.

4.5.4 Lessons Learnt

The following lessons have been extracted from the study:

1. Quality begins at pre-harvest and cannot be improved after harvest, only maintained; therefore, it is important to harvest at the proper maturity stage and at peak quality. Farmers sometimes harvest crops too early due to food deficiency or the desperate need for cash. In this way, the food incurs a loss in nutritional and economic value, and may get wasted if it is not suitable for consumption;
2. Post-harvest losses at storage are associated with both poor storage conditions and lack of storage capacity;
3. Unpredictable government policies especially export bans destroy any gains farmers make on productivity;
4. Local levy (cess) and transport permits delay logistics and erode farmer incomes and profits.

4.6 Enabling policy environment

Maize is a political crop in most countries where it is the staple food. And while all countries, Tanzania included claim to promote regional trade, there is a lot of political economy at play.

The policy constraints that this study gathered from the stakeholders include:

1. Unpredictable government instituted maize export bans, thereby restricting cross border trade, resulting in price collapse in surplus producing areas. When there is no export ban, the exporter is required to get an export permit for each consignment. At the moment, the government has stated there will be no more export bans in future. This needs to be monitored and advocacy instituted where necessary.
2. Arbitrary maize price fixing by NFRA that is not based on market forces. This encourages farmers who are in FDC to default (side sell), eroding the opportunity to develop structured trading system, stifling investments and trade.
3. Poor contract enforcement (FDCs) regime leading to defaults and low investment in farmers. Regulations on contract enforcement should be encouraged.
4. Poor to no enforcement on weights and measures regulation. Middlemen buy by bag not weight leading to dishonesty and loss to farmers. Approved bag weight is 100kg but buyers insist on bags weighing over 120 kg.

5. Duties and taxes on post-harvest technologies, making these unaffordable to most farmers. These could be harmonized with EAC countries.

6. Local taxes (cess) on produce movement. This constrains food movement from surplus areas to deficit areas, erodes farmers’ profits and dampens scaling up investment in productivity enhancing technologies.

7. Restriction of heavy trucks on rural roads and requirement to pay for permits for these. All additional costs are borne by farmers, reducing their competitiveness and profits.

8. High bank interest rates for agriculture related investments.

AGRA could work with the relevant policy makers and non-state actors to advocate for changes to some of these constraints.

5.0 Conclusions and Recommendations

Conclusions

Through engagement with the YieldWise stakeholders during this study, it is evident that the project brought significant understanding on post-harvest management, especially with smallholder farmers.

Adoption of PHT and the partnerships created promise continued use beyond project period. Where market demand is high and assured, farmers are willing to invest and adopt new technologies. An enabling environment is critical for sustainability.

Forward Delivery Contracts (FDCs) should be well evaluated and risk mitigation undertaken. Good communication and transparency will build trust among the actors.

Post-harvest loss management should be undertaken in all crops and not only maize. PHH should be embedded in all production based projects that AGRA invests in.

Crop insurance is needed, especially in the face of climate change to provide farmers with cover and resilience from climate shocks. Price stabilization products should be explored especially because hedging is not used by the stakeholders interviewed. When prices collapse, farmers may end up losing their core assets.
In introducing new products/technologies, AGRA should engage all stakeholders to design products that are market driven. Contract enforcement is critical to mitigate risks for the parties and build trust. In designing projects, AGRA should be very intentional on gender inclusivity and have metrics to measure and monitor impact.

In choosing financial partners, preference should be for partners with a strong footprint in the country and ready to work with smallholder farmers. Financial products should include Technical Assistance (TA) to support SMEs and farmer organizations. Risk sharing models to finance value chains should be explored building from experiences in other AGRA geographies.

Well-articulated advocacy is necessary to resolve the emerging policy constraints including export bans, taxes, tariff and non-tariff barriers and non-compliance of weights and measures regulations, especially at farm level.

Figure 4: Farmers display PICS bags that were promoted through YWS Project

Recommendations

The demand for post-harvest services, e.g. threshing, winnowing, storage, logistics and mechanization in production (tillers, tractors, planters) is high. Private sector should be facilitated to provide these services through structured funding options.

Post-harvest loss management should be tackled from a holistic perspective through private sector partners and FOs for sustainability. This should include inputs, machinery and storage expansion.

Providing financial products for PHL alone is not effective in delivering impact. Access to finance for working capital and capital expenditure should be considered for impact at scale.
Technical assistance to SMEs and financial institutions should be factored in any loan products (funds). This is a main gap in engaging SMEs. Support to informal millers who supply over 65% of maize flour in Tanzania is necessary to help them improve hygiene and production processes while creating jobs for the youth. The Expanded Market Alliance (EMA) project that AGRA is planning (supporting and facilitating SMEs to scale up investment and production) should be extended to these micro-millers.

Engagement with the government at different levels is necessary to ensure alignment and shared vision and quick advocacy for policy change. Support to governments to implement the National Post-Harvest Strategy should be prioritized as this supports the Sustainable Development Goals (SDG) on reduction of post-harvest losses.

While harmonized maize standards and grades have been developed, implementation is still a challenge. Support to government in the implementation of grades and standards is necessary. This could stimulate higher adoption of post-harvest technologies when quality produce fetches a premium.

Aflatoxin contamination of grain reduces marketable qualities and exports. Partnership with private sector in creating awareness and prevention of aflatoxin contamination should be encouraged.

Lessons distilled from YieldWise should inform AGRA interventions on post-harvest loss management across all AGRA operational countries. This should be expanded beyond maize to other cereals (rice, millet sorghum), pulses (beans, soybeans, pigeon peas, green grams, sunflower) and cassava and potatoes.

As the YWS hypothesis stipulated, access to markets and an enabling environment are critical for the adoption of PHL technologies. Advocacy to remove policies that impede investments and trade should be prioritized. This includes export bans/permits, levies, duties on post-harvest technologies and aflatoxin control.
Annexes and Appendices

Appendix 1: Terms of Reference

1. Background of the assignment
   a) YieldWise Project

In Sub-Saharan Africa, post-harvest losses represent a key impediment to transforming smallholder agriculture from a solitary struggle to survive into farming as a business that thrives. For many smallholder farmers living in or near subsistence, increasing productivity and access to markets can help enhance their incomes enough to cover their investments in the next harvest, begin to diversify into other higher-value crops and livestock, and make investments in education and healthcare to improve their family’s well-being. Unfortunately, as the Rockefeller Foundation has identified in its YieldWise Initiative, food loss significantly reduces what farmers are able to get to market and consequently results in income losses of 15% or more for 470 million smallholder farmers, as well as for food traders, processors, transporters, and retailers. This inhibits the development of smallholder agriculture into a productive, efficient, and sustainable system, which is ultimately essential to ensuring food security, lifting millions out of poverty, and driving equitable growth across the continent.

African farmers are increasingly becoming aware of the productivity enhancing technologies. Despite supply chain related issues, farmers have started to access and adopt improved seed and fertilizer. However, post-harvest losses often reverse productivity gains. A meta-analysis conducted by the International Development Research Center (IDRC) estimated the monetary value of post-harvest grain loss in Sub-Saharan Africa (SSA) at US$4 billion which exceeds the value of food aid received by countries in (SSA). This value is also equal to the annual value of cereal imports to (SSA) and annual caloric requirement of 48 million people (Affognon, et al., 2014)

In Tanzania, AGRA is working to double the incomes of 1.5 million smallholder farmers by helping them increase their productivity and close the yield gap, reduce post-harvest losses, and access markets and finance. But analysis shows that there is limited access to post-harvest technologies (PHTs) in the country, such as storage facilities, PICS bags, dryers, thresher, etc. As a result, it is estimated that 30% of maize produced is lost, causing US$92 of opportunity loss per hectare, and ultimately significant reductions in what farmers can do to improve their lives.

AGRA’s work with the Rockefeller Foundation has demonstrated interventions that can reduce these post-harvest losses and significantly increase the incomes of smallholder farmers in Tanzania and elsewhere around the continent. Over the past 2 years, in a pilot phase of the Waste and Spoilage Initiative (later renamed YieldWise Initiative) in Tanzania, the partners have shown that linking market demand and aggregation of supply pulls in the uptake of post-harvest technologies and finance.
Together with the Rockefeller Foundation, AGRA designed the YieldWise (YWS) Project in Tanzania with the aim of reducing post-harvest losses by at least 50% and to increase incomes of smallholder farmers by 25%. The specific objectives of the project are:

1. **Market Demand:** Link 100,000 smallholder farmers to market demand for both large anchor buyers and local alternative markets;
2. **Farmer aggregation and training:** Upgrade 100 aggregation centers, train farmers in postharvest management, promote utilization of improved technologies, and aggregate their crops to meet buyer quantity and quality requirements;
3. **Access to finance:** Use innovative finance mechanisms to promote investments and facilitate distribution and acquisition of technologies;
4. **Scale up adoption of Postharvest Handling technologies:** Promote the adoption of appropriate loss-reducing technologies to improve crop handling, storage, and processing;
5. **Prioritization of loss prevention and Knowledge management:** Support policy analysis and advocacy and evaluation of loss reduction of improved postharvest technologies using standard measurement metrics.

YWS is a specialist intervention in the postharvest and loss reduction for the entire set of smallholder farmers engaged by AGRA under our PIATA program in Tanzania. All the five objectives/components of YieldWise listed above are being promoted as a package. The financial partners that YieldWise have engaged (Equity Bank, Tanzania Postal Bank and Tanzania Agricultural Development Bank) and the postharvest technology manufacturers operate across the country including PIATA Consortia sites.

**b) Partnership for Inclusive Agricultural Transformation in Africa (PIATA)**

In order to maximize impacts and achieve efficiency in resource allocation, AGRA, Bill & Melinda Gates Foundation (BMGF), Rockefeller Foundation (RF), and United States Agency for International Development (USAID), BMZ Germany, and DFID came together to create a Partnership for Inclusive Agricultural Transformation in Africa (PIATA). This is a strategic partnership that seeks to strengthen the alignment and complementarity of efforts deployed by multiple actors working to achieve agricultural transformation in Africa. PIATA is committed to driving collective efforts and providing member organizations with greater ability to deliver impact at scale, a common voice, greater convening power. The partnership is intended to support and complement existing national, regional, and continental bodies and initiatives by providing the necessary support for them to deliver on the Malabo commitments and the Sustainable Development Goals (SDGs).

PIATA leverages on tools, systems, knowledge, and resources of partners to achieve the desired objectives and impact. This partnership is operationalized through AGRA’s full business model of grant-making, consultancies, technical assistance, partnerships, communications and convening.

YWS initiative in Tanzania is scheduled to end this year, December 31, 2019 and AGRA intends to utilize and transfer learnings generated from the Foundation’s investments in loss reduction in
the maize value chain work in Tanzania to address post-harvest loss issues in other crop value chains and transfer these learnings to other countries where we have project operations.

2. Purpose of the assignment
In order to promote post-harvest solutions that can be applied to other crop value chains beyond maize and are suitable to other African agricultural contexts where AGRA is present under PIATA, AGRA seeks to conduct an assessment of several post-harvest management solutions promoted by its YWS project in Tanzania with a view to document lessons, identify strengths and weaknesses of various post-harvest management strategies and recommend specific improvements for future post-harvest interventions in other crops and countries. The study will review the technical, social and commercial viability of post-harvest solutions implemented by YWS in Tanzania, and will generate crop/context-specific recommendations that AGRA and other development partners may adopt in scaling up post-harvest management solutions. The consultant will review the AGRA consortium model of project delivery and propose how YieldWise model can be incorporated in the on-going value chain projects within AGRA work.

This study will focus on 5 components of YieldWise (Market Demand, Farmer aggregation and training; Access to finance; Scale up adoption of Postharvest Handling technologies; and Prioritization of loss prevention and Knowledge management). In addition to the effectiveness of these solutions, the study will also assess supply chain opportunities and constraints of PHH technologies, service provision models, economic analysis (at farmer, supplier, and operator levels), existing and possible financial products as well as required policy dispensations.

3. Scope of Work
In order to fulfill the objectives of this study, the consulting team is expected to review previous post-harvest studies, all YWS outputs and reports and to carry out field visits during which the consultant will collect data and feedback through interactions with targeted stakeholder groups.

This assignment will take place in Dar es Salaam, Dodoma and regions where YieldWise is implemented. These regions are Arusha, Kilimanjaro and Manyara in the North; Iringa, Njombe, Ruvuma, Mbeya, Songwe and Rukwa. The consultant will work with YWS implementing partners, representative FOs from these areas to get their experiences, challenges and proposed changes. The consulting team will be expected to conduct the following tasks with the targeted groups:

a) Market Demand
   - Engage with off-takers and processors to understand their current business needs for the different crops.
   - Assess capacity and coordination among value chain actors
     Conduct competitiveness analysis for supply chains to determine margins, pricing mechanisms, price comparisons between markets (local and regional), best value for time/money spend for farmer, existing intervention gaps, where does YWS add most value.
b) Farmer aggregation and training
- Understanding maize value chain in Tanzania and the incentives for value chain actors to collaborate.
- Review the different aggregation models used by YieldWise, define and identify strengths and weaknesses of the existing models.
- Make recommendations on how aggregation and sourcing from farmers should be managed to maximize value for the farmer and buyer.

c) Access to finance
- Assess the relevance, effectiveness, impact and sustainability of activities that were provided alongside the equipment provision, with particular focus on to women empowerment.
- Assess the models used to finance the acquisition of equipment/technologies, using the lens described immediately above as well as geographic coverage.
- Recommend financing models that would be most effective in activity scale up in a context specific manner, highlighting enablers and potential constraints.
- Identify policies that contribute to a favorable environment for the rapid scale up of equipment/technologies manufacturing, distribution and use.

d) Scale up adoption of Postharvest Handling technologies
- Conduct local markets analysis (product availability, price dynamics and margins) where do you see gaps in the market? Where there are production or biggest market inefficiencies.
- Determine comparative levels of post-harvest losses between mechanized and labor use, and share any additional findings on tangible impact (ex. improved sales).
- Availability of service providers e.g threshers, the cost and the challenges farmers face.
- General user feedback on PHL technology performance (volume of grain lost, cost of technology, convenience, transportation cost, use of fodder, general satisfaction levels, areas of improvement, etc).

e) Prioritization of loss prevention and Knowledge management
- Document loss measurement metrics of different key players
- Assess the level of private sector investment in managing losses in staple crops.

4. Expected Deliverables
The consulting firm or individual consultants are expected to:

a) Prepare a comprehensive report of the lessons learnt from YieldWise with back up data, a set of recommendations for equipment improvements, proposed financing models and proposed approaches for scaling up the uptake of post-harvest solutions and embedding these in the on-going value chain projects in AGRA countries.
b) Work with AGRA’s Communications team to create a video documentary of YWS in Tanzania expressing personal stories of most significant changes from project participants at community level.

c) Prepare an MS PowerPoint presentation summarizing all lessons learned and recommendations.


Applicants must submit a brief (no more than 4 page) proposal for this work, which outlines the proposed technical methodology and plan of work, clarifies any similar studies previously conducted and proposed budget for the assignment.
Appendix 2: Study Tools

YieldWise Learning Study - Tool for FGDs

Instructions to interviewers: Read the consent notice to all interviewees before commencing the interview. Emphasize their right to accept or refuse to participate. Have them sign their consent below.

CONSENT NOTICE: I have been duly informed of the content, purpose and right of participation in the FGD. I hereby agree to participate voluntarily and reserve the right to refuse or discontinue my participation at any given point during the interview. I am fully informed that I am neither entitled nor forgoing any benefits or penalties for my participation or non-participation.

Signed by: …………………………………………………………Date and time: ………………………………………

1. What are the factors that hinder or encourage the adoption of post-harvest management technologies?
2. Are you aware of any PHL management strategies or solutions that are being promoted by YWS Project in Tanzania? If Yes, which ones are they?
3. What are the common processes and/or services farmers use to find post-harvest solutions that meet their needs?
4. What are the perceptions and experiences of the farmers with respect to the PHL management solutions being promoted by YWS Project?
5. How could farmers contribute to promotion of current and future PHL management strategies and solutions?
6. What can the key actors in the maize value chain do to manage aggregation from farmers and maximize value for the farmer and the buyer?
7. What are the capacity gaps among farmer aggregators and what interventions are viable?
8. How would farmer aggregators acquire the skills needed for their aggregation?
9. What do you see as your main needs/opportunities in accessing markets?
10. To whom do you sell your product or service (Traders, processors, exporters, retailers, direct to consumers, etc.)? What percentage goes to each?
11. Describe the relationships you have with the buyers (who determines what to produce, product specifications, prices, and amount purchased?). How much input do you have?
12. How strong is the market for maize in Tanzania right now? Next year? What trends do you see?
13. What standards or certification requirements do your maize need to conform to? Who sets these standards and requirements? Who helps you to conform to these standards and requirements? Do you have any problems in this regard?
14. Where do you go when you need money for your farming?
Do you get credit from input suppliers? What are the terms?
Do you get production financing from your buyers? What are the terms?
Do you have need for additional financing at the moment? If so, what would it be used for?
What sources (formal or informal) have you approached for loans, and what have been the key problems, if any?

15. Are there any government policies on post-harvest grain management that hinder uptake by farmers? If yes, which ones
16. Are there any government policies on post-harvest grain management that promote uptake by farmers? If yes, which ones

YieldWise Learnings Study – Tool for KEY INFORMANTS

Instructions to interviewers: Read the consent notice to all interviewees before commencing the interview. Emphasize their right to accept or refuse to participate. Have them sign their consent below.

CONSENT NOTICE: I have been duly informed of the content, purpose and right of participation in the KII. I hereby agree to participate voluntarily and reserve the right to refuse or discontinue my participation at any given point during the interview. I am fully informed that I am neither entitled nor forgoing any benefits or penalties for my participation or non-participation.

Signed by key informant:…………………………………… Date and time:………………………………………………

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<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Interview cues</th>
<th>Responses from Informants</th>
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<tbody>
<tr>
<td>1.</td>
<td>Name of respondent and contacts</td>
<td>General identification</td>
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<tr>
<td>2.</td>
<td>Level of formal education</td>
<td>Establish level of formal education</td>
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<td>3.</td>
<td>What work do you do? Current occupation</td>
<td>Establish type of work and occupation if any.</td>
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<td>4.</td>
<td>How long have you worked in the organization?</td>
<td>Establish length of stay in that position</td>
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</table>
5. Are you aware of the YWS Project or training opportunities for farmers

   To identify knowledge or participation in YWS project activities. Probe for views etc

6. What is your current relationship with the project

   Establish relationship with YWS project

7. What is your main role in the YWS project

   Establish position of KI

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**Section 2: LEARNING STUDY**

**Thematic Component: Farmer Aggregation and Training**

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<thead>
<tr>
<th>Interview Cues</th>
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<td>Get details of both traditional and new technologies</td>
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| 8. What are the factors that hinder or encourage the adoption of post-harvest management technologies? |
| Get details of both traditional and new technologies |

| 9. Are you aware of any PHL management strategies or solutions that are being promoted by YWS Project in Tanzania? If Yes, which ones are they |
| Establish desired PHL mgt solutions and strengths and weaknesses of the existing models |

| 10. What are the common processes and/or services farmers use to find post-harvest solutions that meet their needs? |

| 11. What are the perceptions and experiences of the farmers with respect to the PHL management solutions being promoted by YWS Project? |

| 12. How could farmers contribute to promotion of current and future PHL management strategies and solutions? |

| 18. What can the key actors in the maize value chain do to manage aggregation from farmers and maximize value for the farmer and the buyer? |

<p>| 19. What are the capacity gaps among farmer aggregators and what interventions are viable? |</p>
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<td><strong>20</strong></td>
<td>How would farmer aggregators acquire the skills needed for their aggregation?</td>
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<td><strong>21</strong></td>
<td>Are there any government policies on post-harvest grain management that hinder uptake by farmers? If yes, which ones</td>
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<tr>
<td><strong>22</strong></td>
<td>Are there any government policies on post-harvest grain management that promote uptake by farmers? If yes, which ones</td>
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<td><strong>23</strong></td>
<td>What do you see as your main needs/opportunities in accessing produce?</td>
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<td><strong>24</strong></td>
<td>To whom do you buy your maize from (large scale farmers, small scale farmers, aggregators, traders, etc.)? What percentage from each?</td>
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<td><strong>25</strong></td>
<td>Describe the relationships you have with these sellers (who determines what to produce, product specifications, prices, and amount purchased?). How much input do you have?</td>
<td>Probe for best value for time/money spend for farmer in the existing intervention gaps</td>
</tr>
<tr>
<td><strong>26</strong></td>
<td>How available is the maize right now, next year, what trends do you see?</td>
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<td><strong>27</strong></td>
<td>What standards or certification requirements do you need to conform to? Who sets these standards and requirements? Who helps you to conform to these standards and requirements?</td>
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<td><strong>28</strong></td>
<td>Do you have any problems or challenges in meeting market standards required?</td>
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<td><strong>28</strong></td>
<td>Do you ever collaborate with other firms that do off-take or processors on purchasing of produce, setting prices,</td>
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<td>determining margins and comparing prices between markets (local and regional?)</td>
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<td>28</td>
<td>Who are your major competitors?</td>
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<td>29</td>
<td>Where does YWS Project add most value?</td>
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<td>30</td>
<td>Are there any government policies on post-harvest grain management that affect demand of maize in the market? If yes, which ones</td>
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<td><strong>Thematic Component: Access to finance (for FIs)</strong></td>
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<tr>
<td>31</td>
<td>Do you have any products or services designed for farmers and aggregators and in particular women? If yes, what are they</td>
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<td>32</td>
<td>Please describe your branch and agent network. Do you have branches in YWS project geography?</td>
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<td>33</td>
<td>What strategies do you have in place to ensure the acquisition of equipment/technologies of PHL management solution being promoted by YWS</td>
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<tr>
<td>34</td>
<td>What is your pricing strategy (i.e., cost of financing, fees etc)</td>
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<tr>
<td>35</td>
<td>Can you recommend any financing models that would be most effective in activity scale up in a context specific manner, highlighting enablers and potential constraints?</td>
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<tr>
<td>36</td>
<td>Are there any government policies that contribute to a favorable environment for the rapid scale up of equipment/technologies manufacturing and use? If yes, which ones</td>
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<td>Question</td>
<td>Response</td>
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<tr>
<td>37. Where do you see gaps in the market for post-harvest handling technologies</td>
<td>Probe for production or biggest market inefficiencies.</td>
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<tr>
<td>38. Describe the challenges and cost farmers encounter while accessing service providers in PHL management</td>
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<tr>
<td>39. Are there any significant differences in the levels of post-harvest losses between mechanized and labor use? If yes, what is the approximate difference</td>
<td>Probe for any additional findings on tangible impact (e.g. improved sales, improved quality etc)</td>
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<tr>
<td>40. What is your opinion on PHL technology performance</td>
<td>Probe for volume of grain lost, cost of technology, convenience, transportation cost, use of fodder, general satisfaction levels, areas of improvement, etc</td>
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<tr>
<td>41. In your business, do you ever encounter product handling losses? If yes, at what stage of the loss measurement matrix?</td>
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<tr>
<td>42. Describe the level of investment you have made in your business to management losses in maize or any other staple crop</td>
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Appendix 3: Key Informant Interviews (KII) Project Implementing Partners

3.1 Center for Sustainable Development Initiatives (CSDI)

Key Informers: i) Ulrich Mwinyiechi, and ii) William Massawe
Category: Project Implementing Partners

The Centre for Sustainable Development Initiatives (CSDI) is a not for profit company with over eight (10) years of experience in working with SMEs (particularly agro-processing value addition) and other grass roots organizations. In Yield-Wise Project, CSDI was the lead implementing partner in a consortium which included Rural Urban Development Initiatives (RUDI) and Building Rural Initiatives through Enterprises (BRITEN). According to Ulrich, the project proposal was designed and submitted to AGRA by Rural Urban Development Initiatives (RUDI), and was to be implemented together with BRITEN. When the project began in October 2016, CSDI was made the lead implementing partner by AGRA.

Each partner had a specific role in the project. CSDI was to work with SMEs and mobilize off-takers or buyers; work with manufacturers of technologies as well as agro-dealers and/or technology distributors; and contact financial linkages. RUDI and BRITEN were to mobilize and aggregate farmers, and train and build the capacity of farmers in PHL. Other roles for RUDI and BRITEN included supervision of aggregation and linking farmers to markets for volumes above the contract volumes and access finances through other channels. The target of farmers to be reached was 100,000 with RUDI having a target of 75% while BRITEN was given a target of 25% out of which 50% were to be youth and women enterprises. Recruitment of farmer organizations (FOs) took over 1.5 years and was to involve the FBOs that participated in the pilot Waste and Spoilage (WAS) project, together with farmers in the Northern Region of Tanzania, expanding the geographical reach.

In 2017, the entry of Farm to Markets Alliance (FtMA) expanded the scope of the project by introducing the component of Good Agriculture Practices (GAP) training which was not initially in the YieldWise Project. Led by WFP, FtMA was comprised of a consortium of several
organizations that included buyers, financial institutions, Insurance companies, input suppliers, equipment suppliers and NGO’s as cooperating partners. AGRA is a partner in the FtMA consortium (AGRA, Bayer, GrowAfrica, IFC, RaboBank, Syngenta, WFP, YARA). With the entry of FtMA, Forward Delivery Contracts (FDCs) between farmers and buyers were to be managed by WFP. Furthermore, WFP undertook to take the lead in the mobilization of anchor buyers; while the alternative buyers were left to other partners. Other partners were added during the implementation of the project and included Innovare for equipment lease, GDI for research and land issues and IPSOS on M&E, a move which brought in more confusion in terms of coordination of activities and strain in the budgets allocated for YieldWise Project activities.

CSDI worked with two types of off-takers, anchor buyers and alternative and agro processors. Anchor buyers bought maize through Forward contracts. This did not work well due to price issues because prices were linked to production. Farmers got input credit from CRDB & NMB banks to produce and aggregate maize and sell through forward contracts to anchor buyers and through Anchor buyer repay the loan. Forward Delivery Contract (FDC) was between farmers and anchor buyers. Loan credit was a tripartite agreement between the bank-farmers-anchor buyers but the loan applicant is the framers. Alternative buyers did not want FDC but wanted to pay spot price (market price). However, farmers could not access bank loans without a FDC. WFP data collection on sales reports from anchor buyers was not provided. Also the export ban in 2017/2018 affected aggregation and sales for maize.

The project trained only 64,188 farmers in GAP and PHH due to budget constraints. Training of Trainers for 24 field officers was first done followed by training of farmers. PH loss management equipment was bought and distributed but there was problem of on-time delivery to farmers due to procurement challenges.

In access to finance, Equity Bank and TPB were given $400,000 as a revolving fund for PH technologies while TADB was given $610,000 as a matching fund for anchor buyers and processors to invest in PHH equipment such as silos, milling machine, threshers, dryers and weighing bridge to enable them to buy more maize from farmers. The challenge was very low uptake of loan portfolio from all the banks. All the borrowed funds were to go for PHL technologies whose demand and margins cannot sustain a business. Most borrowers wanted the whole value chain to be financed. Technology distributors and manufacturers participated in the training, distribution and promotion of technologies include PPTL for PICS bags brand; A to Z for Agro Z bags brand and tarpaulins; and GrainPro for Super bag and cocoons and Zero Fly bags from Vestergaard. Other companies that were involved in the promotion and distribution of technologies are HELVETAS for metal silos, WFP which brought in hermetic plastic silos from Uganda, manufactured by Smileplast, Intermec Engineering Ltd for metal silos and dryers from Morogoro, and Cimbria who are manufacturers and suppliers of PHH technologies from Kenya. HELVETAS trained local artisans to fabricate metal silos. Plastic silos were preferred because they
are easy to use, can be stored inside farmers’ house and can be used for other purposes, e.g. water storage but are not manufactured locally. The prices of hermetic storage were perceived to be too high- Tsh 3,600 to agrodealer, who sells at Tsh4,500-5,000 per piece to farmers.

Taxes on technologies affected pricing and off-take (metal silo plates and cocoons). The tax should be reviewed.

The project has collaborated with other stakeholders to develop the National Post Harvest Management strategy which was launched in August with 2000 copies of English version printed and 10,000 copies of popular version in Kiswahili.

### 3.2 Building Rural Incomes through Enterprises (BRITEN)

**Key Informer: Josephine Miingi**  
**Category: Project Implementing Partner**

Building Rural Incomes Through Enterprise (BRiTEN) is a social enterprise that is non-profit making dedicated to increasing incomes and improving livelihoods through empowering rural agribusinesses (farmers and entrepreneurs). BRiTEN specializes in agricultural development initiatives, designed to facilitate market access, enhance agribusiness competitiveness, increase productivity and improve access to inputs and finance. BRiTEN works in collaboration with Government and other private sector partners in developing market systems, by addressing underlying causes of weak performance in order to unleash large-scale and systemic change.

The role of BRiTEN in Yield-Wise Project was to mobilize farmers and aggregators; training of farmers on GAP and PHH; mobilization and monitoring of aggregation; on-farm verification of inputs; supervision for aggregators; linking farmers to markets and agro-dealers for inputs.

According to BRiTEN’s founder, Josephine Miingi, leveraging the partnerships of FtMA and Yield-Wise helped enhance the outcomes. The introduction of the GAP component as a deliverable was favored by the farmers and made a big impact. YieldWise Project development model has been used in designing other projects such as USAID Nafaka Project and One Acre Fund in Tanzania. YieldWise Project training in GAP and PHH paid off in regions like Rukwa and Ruvuma where farmers had the highest production.

As a result of the project, the government and other players (buyers and agro-dealers) have changed their opinion of AMCOs and now are engaging with them. The quality of produce from farmers has improved and farmers are able to negotiate better prices. Some Saccos in Rukwa became the main aggregators for Musoma Foods. Selling through AMCOs made good business for farmers as well as off-takers who preferred buying from AMCOs than going direct from one
farm to the other to collect maize. Also FDCs have been adopted for other crops e.g Silverland has signed FDCs with farmers for beans. After a few purchases from AMCOS, they now trust them especially on produce quality.

The project financed only PHH technologies (bags and silos) but farmers wanted other technologies like threshers to be included. Agro-dealers on the other hand wanted other inputs to be included and working capital to buy back produce from the farmers. There is also the need to diversify to other crops like pigeon peas, beans; and include animal feeds to enlarge the maize market.

World Food Programme (WFP) who was a buyer of last resort failed to buy the produce when there was a surplus that was caused by the government’s ban on maize export bans and the prices dropped. This year 2019, prices Tsh 700-1000 per kg and this is highest price in a long time, occasioned by low production and climate change. Farmers were disappointed in the 2017/2018 season when prices collapsed and could not borrow for inputs the following season (2018/2019). BRTIEN was monitoring repayment of bank loans although they were not involved in negotiating and restructuring of the loan. There was a loan guarantee that was provided by PASS to cover inputs for input suppliers. There was no insurance to cover production failure or price collapse and so, when prices of maize collapsed, the farmers defaulted in loan repayment and the insurance was not activated to cover them for defaulting to pay the loan. They had to pay the loans by themselves. They did not understand the insurance product and did not even have a copy of the contract.

On how the consortium was managed, BRTIEN said that the entry of FtMA brought in a lot of confusion and new deliverables like training on GAP that was not initially in the YieldWise project and introduction of new geographies. This led to a strain in the budgets allocated to activities on YieldWise as they had to cover for the added costs. There were also too many changes in leadership, partners and relationships. The entry of the new partners through FtMA that was led by WFP meant that AGRA had no control or influence on project delivery. FtMA made operations complicated as each had their own priorities and reporting requirements. From December 2017, BRTIEN did not receive any funding from AGRA and therefore were not implementing any activities as they got suspended together with RUDI. This suspension strained and broke down the relationship of the organizations. The YieldWise Project AGRA program Officer could not effectively manage and provide leadership to the grantees and communication routes/channels broke down.

3.3 Rural Urban Development Initiative (RUDI)

Key Informers: Abel Lyimo – CEO; and Lameck Kikoka – Director, Technical Operations
Category: Project Implementing Partner

Rural and Urban Development Initiative (RUDI) is a locally registered NGO and operates in all of Tanzania Regions. YieldWise Project proposal was prepared by RUDI together with AGRA but was not the lead implementing partner, but instead CSDI was the one that became the lead implementing partner. The role of RUDI in the project was to establish aggregation centers, train farmers in PHH and GAP and promote PHL technologies. RUDI were given a target to reach 75,000 farmers during the 4 year life of the project.

In 2017, RUDI and BRiTEN were suspended from YieldWise Project due to another project that was not related to YieldWise. They were later reinstated in August 2018 but were not given any funds for activities until May 2019 when they got funds to pay staff salaries; although they still have arrears. They still have staff salary arrears of Tsh 43,836,000 ($18,000) for that period when they were suspended. RUDI feels that this issue of staff salaries should be resolved before the closure of the project.

As a result of YieldWise Project RUDI is now a member of National Post-harvest strategy 2019-2029 to reduce PHL by 50% by 2025 of current levels. A national post-harvest Strategy was launched in August 2019. The Government has a better appreciation of PHL and has removed VAT on PHL equipment – PICS, metal silos after intervention with the government and policy makers spearheaded by Agricultural Non State Actors Forum (ANSAF) and Eastern Africa Grain Council (EAGC). Tax on cocoons has not yet been removed as parliamentarians do not understand what it is. African Development Bank (AfDB) granted the government $30M towards PHL initiatives. The government also received a grant from the Polish government to build a network of metal silos that have driers and cleaning equipment throughout the country in NFRA facilities.

The awareness that was created through the project on PHL has resulted in the reduction of post-harvest losses to 13% in maize and 9-10% in rice. The demand for PHL technologies such as hermetic bags and plastic silos by farmers has increased. According to Abel Lyimo and Lameck Kikoka, buyers feel the prices of hermetic storage is too high at Tsh.4,500 – Tsh.5000 per bag and also the network of distributors needs to be expanded. Metal silos did not work for farmers due to the poor quality and cost (low gauge steel plates which were weak and needed to be fabricated on site)

Training of farmers in GAP and PHL Management doubled productivity of maize from 5 bags per acre to 12 – 18 bags per acre. But due to collapse of prices in 2018 farmers in Iringa could not repay loans. They had a forward delivery contract price of Tsh350 per kg but the market price dropped to below Tsh250 per kg. Off-takers defaulted and did not collect produce. WFP topped the market price to contract price for some areas by paying direct to the bank. Under FTMA, loan guarantee to PASS - farmers paid the insurance cover but it was not activated when production
failed in the North nor when prices collapsed and they could not pay the loans. The insurance product was not explained to farmers and it was not clear when it gets activated, though farmers paid for it. In the North, farmers received inputs late and germination was poor and therefore did not harvest anything, but PASS did not pay farmers under production failure. WFP which was the buyer of last resort did not buy from farmers but from big suppliers such as Export Trading Group and Musoma Foods. There was also no incentive for quality of produce from farmers since the off-takers did not offer any premium price for clean and properly dried produce.

Appendix 4: Key Informant Interviews – Off-Takers and Processors

4.1 Real World Limited

Key Informer: Savior Chanay, Managing Director
Category: Aggregator and Processor in Songea

Based in Songea, Real World is a milling company that mills maize flour for human consumption and animal feeds with a milling capacity of 7000MT per year for maize flour and 4500MT per year for animal feeds. Their maize brand is called ‘Sembe’ and sells in packages of 25kg and 5kgs. Their market spreads from Ruvuma, Mtwara, Masasi, Riwale and Dar es Salaam.

The off-taker collects from FOs aggregation center, provides them with bags and stitching material. FOs, have higher volumes and quality, e.g. Magagura had 270MT lots. In 2017 he paid to farmer organizations at Tsh460/kg of maize and Tsh400/ kg from traders and individual farmers.

Mr. Chanay said that forward contract floor prices is good and if market price is higher than the floor contract price, he negotiates with FOs the new price to slightly above market price for clean produce. If market price is lower than FC floor price like in 2018 when the contract price was at Tsh.320 – 350 per kg, farmer organizations want to be paid the contract price. During that year, WFP had to top up with Tsh30 per kg while he paid Tsh290 per kg to make it Tsh320 per kg. In 2019, forward contact was agreed at Tsh.270 / kg. At off-take, market price was Tsh400/kg. Farmers demanded Tsh450-600/kg against a contract of Tsh270/kg. Farmers withheld stocks to sell to highest bidder currently at 690/kg in

“We buy maize from small-scale farmers who are either in groups or as individuals; but we prefer buying from groups who aggregate because they have been trained on quality requirements. The maize is dry and there is no foreign matter. 60% of our maize is bought from these groups while 40% is bought from other traders” says Savior Chanay, the managing director.
Songea. They only delivered enough volumes to cover the loan they had taken at a higher negotiated price. Some of the successes highlighted by Chanay on the successes of the project include improved productivity through value chain structuring and high quality of produce from farmers. Under YieldWise Project farmers’ productivity improved from 7 bags to 15-22 bags per acre and some farmers are reaching 25-30 bags.

Real World is currently expanding after they got a loan from TADB amounting to Tsh.600 million and a matching grant from AGRA amounting to $58,000. The money is being used to buy processing machinery for milling that has a capacity of 30MT per 8 hrs and metal silos with a capacity of 1000MT and a weighbridge. The silos will also come with a drier and a cleaner unit which will contribute to PHL reduction at factory level and increase his processing capacity. He says that losses will reduce by 70% because the system is automatic and silos control ventilation system to cleaning units. The processing machinery that was procured locally in Tanzania will be installed and commissioned by January 2020 while the silos that are being imported from China will be completed by March 2020.

The following issues were raised by the director of Real World in regard to government policy and other recommendations:

- The import duty imposed on metal silos and other PH equipment like dryers and cleaners is high at 25% of the cost plus 18% VAT.
- Vehicle load limitation on rural roads to 5-7 Mt from 30MT, making transport costs high to collect produce from farmers; transport permit required for weight above this
- Government sets prices that are higher than the prevailing market rates and yet NFRA is not able to purchase all produce from farmers at that rate. The government should stop interfering in business and let the markets work. In 2019, floor price was Tsh.320-350 per kg but market price is over Tsh800/kg with very little deliveries to NFRA.

Other issues that were raised include:

- Farmer Organizations are paid by processors after one week
- Processors need access to working capital to buy and pay deliveries on time.
- Initially, there was miscommunication on matching grant. They expected 100%. Some wanted to expand milling capacity while others silos only. A maximum of $40,000 was allocated for milling machines and $80,000 for silos. AGRA only to pay 30% but not exceeding $ 40K or 80 K. Real World received $58,000 as 30% of his investment. Most SMEs do not have enough collateral to take big loans and qualify for the $120,000 (investment would have to be $400,000).
4.2 Ruaha Milling Company (RMC) – Iringa

**Key Informant:** Mr. Atanas Kipeto (L) – Managing Director  
**Category:** Off-taker/processor and Input Supplier

*Figure 5: Ruaha Milling Company in Iringa*

Ruaha Milling is situated in Iringa and undertakes milling of rice, sunflower and maize. He buys maize from FOs that have aggregated because their maize is clean and of good quality. According to Mr. Atanas Kipeto, the farmers that were involved with YieldWise Project received training in GAP and were able to increase their productivity.

In 2017 Ruaha had entered into a forward delivery contract arrangement with farmers in Songea. The FDC price was Tsh402 per kg (approx US$179/MT) but the market price collapsed and dropped to Tsh.320 per kg. The government had given an indicative price of Tsh550 but did not buy all the maize from the farmers. Farmers refused to sell to other traders thinking that the government would buy. That same year, Ruaha Milling purchased 8000MT of maize from farmers through the FDC instrument. Farmers were paid through their bank accounts and their inputs debt was cleared in full.

The risk fund from WFP/FtMA to cover price drop was never put in place. Only $300,000 was provided by FtMA to offset farmers’ loans in Mbeya, Rukwa, Njombe and Ruvuma but not enough to cover the full farmer loan difference. FtMA had promised off-takers to arrange working capital for buying maize from farmers. This was only effected to a few off-takers like Musoma Foods and Tanfeeds. WFP did not engage all the off-takers and yet they had committed to work with the off-takers in YieldWise Project.
Ruaha Milling claimed that they did not access the WFP food aid market and gave the order to only one off-taker, Musoma Foods who bought directly from the farmers at Tsh.240 per kg and not from the other off-takers and sold to WFP at Tsh800 per kg. According to Ruaha, there was lack of transparency in the way the contracts were being handled and recommends that in future, all parties in the contract should be informed of all the details of the contract.

Despite all the challenges that Ruaha had with FDCs, he continues to engage farmers with value chain financing arrangements. He will guarantee farmers in Iringa to get fertilizer from Yara. Farmers will pay upfront 50% of the cost of the fertilizer required and the balance to be paid to Yara when Ruaha buys maize from them. He currently has on order for 800MT of fertilizer for 8,000 acres from 1500 farmers which he says he can only be able to handle 25% of this because he has no storage to handle this volume of produce from the farmers. Ruaha favors value chain financing. He pays his contracted farmers market price if floor price is below market price. This way, they are able to repay the inputs loan. Farmers buy the maize seed (choice of preferred variety) and he supplies fertilizers and other inputs only.

4.3 Mema Holding – Kiteto

Figure 6: Mema Holding Engaging Farmers for FDCs in Kiteto

Key Informant:  1. Moustafa Maulid – Business Development Director
                2. Zeina Omari – Accountant

Category: Off-taker and Processor

Mema Holdings started in 2011 as a vegetable supplier in Dar es Salaam where they were growing in a 5-acre greenhouse. In 2015, they started poultry production, rearing 6000 broilers for sale. In 2016, the company started maize processing after hiring a building where they installed a machine with a milling capacity of 10MT per day. In 2017, they started building a factory in
Kigamboni Dar es Salaam, and the milling became operational since May 2017 with a capacity of 30-35MT per day. The company has a warehouse in Dar es Salaam with a capacity of 1000MT.

Due to the challenge of storage in the rural areas, the warehouses that they were renting were infested with rodents and they used to incur huge losses. So they decided to build their own warehouses and silos through a funding of $250,000 as a loan and $50,000 as a grant for PH projects from United Nations Capital Development Fund (UNCDF)-Strengthening Small Businesses Project and another loan of $350,000 from NMB. The silos were imported from Germany and will have a carrying capacity of 2000MT. The silos have a cleaning and drying unit and this will help in reducing PH losses. They also come with a weighing bridge scale.

Mema Holdings has been buying maize from Kiteto and since expansion; the company has been facing challenges of getting volumes of quality maize for their milling factory. They decided to start working directly with the farmers and through the government extension officers started offering training on GAP to farmers in Kiteto. They also hired a trainer in PHL management to train the farmers. They also introduced use of Tarpaulins for drying maize to reduce losses and keep the maize clean instead of spreading it on the ground. Mema has identified 1400 individual farmers as contract farmers with an average 2-5 acres of land per farmer. They give farmers input loans to cover production (fertilizer and seeds) and farmers repay with produce equivalent to the cost of production input borrowed based on the market prices at harvest. This guaranteed them of no default from the farmers. The contracted farmers are achieving yield of 10-15 bags per acre when they have the right inputs, but without inputs, most farmers produce 5 bags per acre. At harvest, they provide polypropylene bags at Tsh600 per bag to farmers.

Figure 7: Cost Analysis for farmers

The company is also working with 15 AMCOs with over 10,000 members from Kiteto. The demand for the miller is 10,000 – 15,000MT which is way below the anticipated production of the 10,000
farmers in the AMCOs (approx. 220,000MT) and Mema Holdings cannot afford to provide input to all of them. They have otherwise proposed to introduce the warehouse receipt system (WRS) with the AMCOs and any other individual farmers. The individual farmers contracted will provide the volumes needed by Mema milling, but the silos will be open for AMCOs to store their maize for grain trading through a volume and price contract. Collection centers will be established in various locations in Kiteto as aggregation centers. Processors from Kenya are interested in this arrangement especially if the government does not impose maize export bans.

4.4 Union Service Stores – Moshi

Key Informant: 1. Martin E. Silayo – Production Manager  
2. Vitalis Kimario – Operations Manager

Category: Off-taker and Processor

Figure 8: Inside the Milling plant of Union Service Stores in Moshi

Union Service Stores is a grain processing and aggregation company with clients in Tanzania and Kenya. They deal in buying and selling maize, barley, sorghum and beans and pulses. They also process flour for human consumption and maize meal. They mill 90% of grits used as raw materials for beer industry in Tanzania. Also Sorghum and millet is milled for Serengeti Breweries, a subsidiary of EABL in Tanzania.

They have two mini silos of 600MT capacity. The silos were imported from China and are beneficial because they are able to store a big quantity of grain in a small space. The cost of
maintaining the grain is minimal. The company also has a cleaner and drier for produce that is stored in the warehouses.

The company has worked with YieldWise project by engaging farmers who were trained on GAP and PHH. Through the project, they were able to expand the farmer outreach to Arusha and other districts in the North. They are targeting to have 80% of their suppliers from FOs and the other 20% from traders and commercial farmers. They started working with 5 FOs but have now increased the number to 25 in the Northern zone. The target is to have 50 FOs in the northern zone and 40 FOs in the Southern zone. According to Martin Silayo, the future is positive with the farmer organizations.

Union Service Stores has engaged farmers in Forward Delivery Contracts (FDCs) which provide a floor price and they are able to negotiate with farmers when the price goes high to enable farmers accommodate cost of production and a reasonable margin. They train farmers but do not provide inputs and this has improved productivity from 5 bags to 15 bags per acre and reduced PHL for farmers. Trained farmers are then engaged with contracts. The company is willing to extend the same contract model for beans and pulses value chains.

According to Martin, farmers’ lack of financial knowledge is the main reason they side sell and default in honoring their contracts with the buyers. He said that the banks expect the off-takers to push the farmers to pay the loan by buying their produce.

Union Service Stores would want to supply FOs with inputs if the farmers are willing to aggregate their orders and commit to supply them with produce.

Off-takers like Union Service Stores are willing to increase the volumes purchased from the farmers but do not have storage facilities with high capacity. They are looking for financing for CAPEX to invest in these PHH technologies.

Logistics is also another challenging aspect of the off-takers especially those who don’t have their own transport. They are sometimes forced to pay cess multiple times when they are crossing from one region to another. The cess charged is Tsh.1200 per 100kg bag.

Limited working capital is another challenge that is faced by Union Service Stores. Banks delay in providing requested loans for working capital. They have to wait until they sell the stock in their warehouses before they can start buying from the farmers.

Their export trade is also affected due to the export ban by the government and the delays occasioned by the government providing them with export permits. Cess tax in Kenya for produce coming from Tanzania is charged at Ksh50 per 90kg bag which is very high. If the drivers don’t pay they are taken to court in Kenya and the off-taker is the one who pays for these costs.
Martin thinks that YieldWise Project should have considered the entire value chain and not focus only on farmers and PHL.

4.5 Apeck International – Dar e Salaam

Key Informant: Allen Killewo
Category: Off-taker

Apeck was one of the off-takers in the YieldWise Project and had an engagement with the farmers for 2 years in the project since 2017. When the company joined the project, they took over contracts that had been signed by other off-takers but did not show up to buy produce from farmers. Apeck bought 2000MT at Tsh430 per kg in Songea.

During the 2017/18 season, he signed FDCs with farmers with a floor price of Tsh350 per kg. After the harvest, prices dropped to between Tsh190 – Tsh 200 per kg. Apeck agreed to take maize after consultation with the farmers, FtMA and the government and store the produce properly so that it’s not destroyed by the bad weather at that time. Farmers do not have proper storage facilities and therefore had kept their aggregated produce outside, (covered with tarpaulins) so there was that fear that the maize will be destroyed. After negotiations, APECK agreed to pay farmers Tsh240/kg while WFP agreed to top up with Tsh110 per kg so as to enable farmers get the price of Tsh350 that was in the FDC. WFP paid 4 FOs that were able to meet the condition of aggregating stock that will enable farmers to clear the loan they had taken. APECK ended up paying the other FOs that did not meet this condition but had given them their produce at a price of Tsh350 that was in the FDC. For these FOs, he paid them in April 2019 for produce he collected in November, 2018. He however said he paid farmers the contract price which was higher than the market price. When informed that the farmers’ accounts were hit with penalty for late payment, he contended that this was still less than if he had bought the produce at the market price of Tsh.200/kg (he paid Tsh.350/kg)

In 2018/2019 season, new FDCs were signed between APECK and the farmers with a contract price of Tsh380 per kg. This year, there is a shortage of maize due to poor yields witnessed by the farmers. The farmers have defaulted in delivery of maize to APECK. According to Allen (APECK), those farmers who have the produce are sideselling because the market prices are high (700-900/kg- (US$395/MT)) and the contracts are not enforced. Some are selling to APECK at individual level even though they are members of FOs that had signed contracts with them.

According to APECK’s Allen Killewo, the following lessons can be distilled from the operations of YieldWise Project: that there is need for farmers to start operating as a business and learn to take risks that can accrue in a business. In YieldWise Project, the engagement with farmers had FtMA consortium cushioning or bailing out farmers in case of any eventualities in the contracts with the off-takers. He said that the off-takers bear all the costs in the maize value chain. Farmers are
producing inefficiently by taking high loans and purchasing inputs at high prices without considering the profits that they will be able to make.

APECK recommended a mindset change for farmers. He also said that all parties in FDCs should be involved in drafting contracts and each party should place a bank performance bond as a commitment in contract enforcement. Anyone who defaults loses their bond.

4.6 Tandale Market

![Small Scale Millers in Tandale market, Dar es salaam](image)

This is the wholesale grain market with many small scale millers. They use hammers mills. The maize is dehulled and degemred, producing very highly refined maize flour. The government has provided these small millers with fortification equipment for free. They also get the fortification premix free from the government. This is aimed at fortifying all maize flour, from the formal and informal sector. The flour they produce is well packed and branded. The estimate is that 65% or more of all maize flour al in Tanzania is made by the informal sector millers.

Maize traders who supply the millers buy maize at 40-55,000 per 100 kg bag at farm gate. They sell at 80,000 wholesale price at Tandale market. The maize trader bears all the subsequent costs. Their main activities include networking with local assemblers, serving as a market outlet for farmers, and collecting and cleaning the maize grain before selling. Their main market is in Tandale Market in Dar es Salaam. Urban traders are also sources of bagging materials (sacks) used by farmers as well as market (price and volumes) information in their areas of operation.

Table 10: Transaction Costs for Traders

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Units</th>
<th>Cost per unit (Tsh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase from Farmers</td>
<td>120-130kg bag</td>
<td>40,000 – 55,000</td>
</tr>
<tr>
<td>Loading</td>
<td>100kg bag</td>
<td>800</td>
</tr>
<tr>
<td>Transport</td>
<td>100kg bag</td>
<td>1000</td>
</tr>
</tbody>
</table>
The bags he was selling were all at 120-130kg but paid farmers as 100 kg per bag. But he sells to wholesalers on weight and each bag is weighed. Because levy is paid per bag not by weight, the transporters want the bags to be over 100 kgs to pay less levy.

There is opportunity to design a program to work with these informal millers to improve the hygiene and operations of their businesses. Magnets placed at the mill exit can eliminate most of the metal schaffings coming from the hammer mills.

Appendix 5: Key Informant Interview – Enabling Environment

5.1 Regional Agriculture Administrator (RAA) – Ruvuma Region

Key Informer: Mr. Andrew P. Tarimo
Category: Government Policy and Enabling Environment

According to the RAA for Ruvuma Region, the Government has prioritized post-harvest loss management by collaborating with the Polish government who are putting up metal silos at NFRA stores & dryers to reduce PHL as farmer productivity increases.

He said that the hermetic bags (both PICS bags and Agro Z) have reduced PHL at household level but the challenge still remains the price of the bags which retail at between Tsh.4000 to Tsh.5000 per bag. Mr. Tarimo agreed that the hermetic bags technology is effective since the users have no health concerns because they don’t have to use chemicals in their stored grain for home consumption. The only concern is that some farmers use chemicals to preserve the maize they sell to off-takers and processors. The price of plastic silos on the other hand is too high at Tsh. 256,000 (US$115) and prohibitive to small-holder farmers in Tanzania.

He reckoned that awareness and education of farmers should continue especially through extension officers on how to reduce PHL and with agro-dealers who are distributors of technologies in the rural areas, to assure farmers access and adoption. NFRA teaches farmers on quality and moisture levels because high moisture levels cause aflatoxin contamination. Also farmers have a wrong perception and believe that if you do not winnow the grain, weevils do not eat the grain as they prefer the bran. The installed dryers and cleaners at NFRA will mitigate PHL especially when rains come early before the crop fully dries.
Cess (local levy) is only charged if more than 10 bags are being transported to the market at 5% of market price levied per bag (this cost is mainly borne by farmers as buyers and off-takers factor this in the price they offer). Tanzania Rural Roads Authority (TARURA) controls the limit weight of trucks on rural roads due to road damage in Songea. Only vehicles below 10MT allowed. 30MT weight on rural feeder roads need to pay a permit fee that goes toward road maintenance. This raises the cost of transporting produce to the market and is borne by farmers. Off-takers do not have enough small vehicles to move thousands of tons of produce before the rains set and roads become impassable. In 2018, farmers had to come together and petitioned the government through advocacy to remove this control imposed on movement of trucks to get their produce to the market.

The RAA was of the opinion that for projects to succeed and be sustainable there must be a good exit strategy of farmer adoption of technologies and partnership with government extension officers. He felt Some NGOs are not transparent and do not reveal their budgets for the work they do in the region. Ministry of Agriculture (MOA) has started organizing stakeholder consultative meetings to enhance coordination of NGOs to avoid duplication of interventions.

**Appendix 6: Key Informant Interviews (KII) - Agro-Dealers**

**6.1 Alpha Agro-Vet – Iringa**

**Key Informant: Alpha Mgimba – Managing Director**  
**Category: Agro-Dealer selling PH technologies**

![Alpha Mgimba, one of the beneficiaries of revolving fund loan](image)

Alpha Agrovet was not initially in the distribution program of YieldWise Project but has been working with manufacturers of hermetic bags as a distributor – A to Z for Agro Z bags and PPTL for PICS bags. He said that during the demonstration and promotion of the new bags, the bags
were being sold to farmers at a discount – 3 bags for Tsh.10,000. This caused a confusion with farmers accusing the agro dealers for selling them at a higher cost of Tsh.5000 if buying one and Tsh4,500 if buying from 5 bags and above. The farmers perceived the agro-dealers to be exploiting them. He advised that farmers should be made aware of the market price of these new products during their promotion so as to avoid such confusion and mistrust.

Alpha says he can sell between 3000 – 4000 pieces in one season and most of his customers come to his shop to buy over the counter. He also has employed agronomists who train farmers in the field through demonstration farms and therefore get the opportunity to train farmers on how to use the hermetic bags.

According to Alpha, the new PHL technology is good with both the PICS and Agro-Z bags being effective only that farmers have a challenge in handling the bags during the storage process. For instance, some farmers store grain with high moisture content; some leave the bags to stay out for a long time after packing the maize; while others were stitching the bags instead of tying them up as required thereby destroying the bags. Some farmers also have had their bags destroyed by rodents such as rats. Plastic silos were widely preferred by farmers due to its storage capacity and cannot be destroyed by rodents. The silos can also be used for other purposes like storing water.

He says that adoption of the technologies was slow due to the high price. Some farmers still use chemicals such as the liquid actelic super to preserve their maize. That maize needs to stay for 16 years before the food can be consumed. The cost of these chemicals is still low compared to the prices of these hermetic bags.

In YieldWise Project, Alpha Agrovet was involved in input supply for farmers through the FtMA. There were two arrangements. The first arrangement is where the FOs placed their aggregated orders to the hub Agro-dealer who supplies the inputs to farmers. The bank will pay the agro-dealer on behalf of the farmers. The farmers were required to deposit 20% of the total input cost in their account at the bank (NMB and CRDB involved). When the hub agro-dealer delivers the inputs to the FOs the bank pays them immediately on presentation of a delivery note. The second arrangement was where the farmers were required to deposit 20% of their inputs cost in their account at the bank. The agro-dealer supplies the farmers with inputs on credit with FtMA guaranteeing them. The hub agro-dealer will then be paid in full after harvest when the FOs produce is sold and they are paid by the off-taker.

In both arrangements, farmers were not given the opportunity to choose seeds that perform well in their agro-ecological zones. One such seed company was Syngenta which provided some farmer organizations with seeds that did not germinate leading to a total crop failure. Farmers were not able to pay their loan and Alpha Agro-vet is still owed Tsh7 million worth of commission
in this deal. PASS which had guaranteed the input loans at 68% of the loans has not activated the guarantee and farmers want to take legal action against Syngenta for refusing to compensate them.

Alpha says that the purpose of the project was good and noble but the way it was managed was the cause of the problems. Farmers should have been given a choice on inputs they wanted and not be bound by FtMA partner products.

6.2 Tabe Agrovet – Arusha

Key Informant: Mr. D. Tabe- CEO
Category: Technology Distributro/ Agro-Dealer

Figure 11: TABE Agrovets in Arusha

Tabe Agrovet is situated outside of Arusha town. The owner is aware of YieldWise Project and stocks hermetic storage bags, especially PICS but not to the level he would like to because of he was not able to access the loans from the banks due to the high interest rates charged on the loans. The collateral required by Equity Bank was too high for him to afford. They were asking for residential buildings hence did not use the bank facility.

According to him, farmers are happy with the technologies and want to buy. AGRA should have consulted with the stakeholders to design financial products for PHL. The funds provided should have covered more than the PH: technologies but other inputs like seeds and fertilizer as well.
He said farmers prefer PICS bags and perceive them to work well. They say that A-Z bags do not work well because the liner is thin. They also complained that the price of the PICS bags was very high at Tsh 4000 from Manufacturer, and retailing at Tsh 4,500 to Tsh 5,000, which is high. Rats destroy these bags. Farmers are buying 5-10 bags to store produce for their own home consumption. According to him the demand is good.

YieldWise project created PHL awareness and helped create demand for other inputs and technologies.

Appendix 7: Key Informant Interviews (KII) - Technology Manufacturers

7.1 A to Z Textile Company – Arusha

Figure 12: A to Z Textiles Director, Mr. Binesh Haria

Key Informant: Julius Nyabichi

Category: PH Technology Manufacturer

A to Z Textile Limited is based in Arusha with 5 factories that are housed in one complex that sits on 110 acres of land. The company is the second leading manufacturer of cement bags in Africa. It is also the leading manufacturer of mosquito nets in Africa through collaboration of the World Bank, IMF and USAID funding. Other products that are manufactured by the company include plastics such as thermos flasks, chairs, tables, water bottles etc. They also manufacture garments for export, including Nike brands.

Agriculture business is a small unit of the of A to Z business lines in which the company manufactures plastic crates, greenhouse nets, water bottles, polypropylene bags for grain storage and fertilizer bags etc. For PHL technology, the company manufactures three products
that include hermetic bags, tarpaulins and Aflasafe – a new product aimed for prevention of aflatoxin in maize and ground nuts during growing phase.

According to Julius Nyabichi, by A to Z participating in YieldWise Project, they were able to reach farmers and create awareness for the hermetic bags. YieldWise gave them a platform that enhanced increase of adoption rate of PHH technologies which was a new product hence difficult to penetrate the market. The financial facility that was included in the project through Equity Bank and TPB, to Agro-dealers who got the loan were able to stock the products. The money was paid directly into A to Z bank account and they delivered the products directly to the agro-dealers. A to Z managed to bring 350 agro-dealers on board and the list is now growing to 420 agro-dealers. The company has appointed field staff in Mwanza, Kahama, Mbeya, Rukwa, Songea, Morogoro, Arusha, and Makabago who give guidance, evaluate stock levels and provide technical support to agro-dealers. They are able to make follow-up for business sustainability.

The company invested in a liner machine that combines 5 layers into one at a cost of US$500,000 and an additional US$100,000 as marketing costs. The machine has a capacity of producing 200,000 bags in a day. According to Julius, the machine is only utilized 5% of the time.

Tanzania is a slower market for new technologies and therefore there is need to invest in awareness and education of farmers in order to increase the adoption rate. Distribution through farmer groups /SACCOS is possible if they are able to come together and aggregate their orders. The price of one bag from the factory delivered to the distributor is Tsh.3600 per bag.

Appendix 8: Key Informant Interview (KII) – Financial Partners

8.1 Tanzania Post Bank (TPB) – Dar es Salaam

Key Informant: 1. Agnes Chihoma (L) – Senior Manager, Credit Administration
Tanzania Post Bank (TPB) was one of the financial partners in the YieldWise Project, together with Equity Bank, Tanzania, that were to run a revolving fund for SMEs and Agro-dealers to finance distribution of PHH technologies to farmers. TPB signed a contract with AGRA in May 2018 and they received the funds amounting to $200,000 in June 2018. The bank was to provide an equivalent amount to make the total kitty $400,000. The agreement was that the bank shall provide loans to agro-dealers and aggregators for PHL technologies including hermetic bags, cocoons, and metal silos. CSDI trained TPB staff and established relationships between the bank and the project officers, agro-dealers and SMEs borrowing for post-harvest technologies in the project area.

The uptake of the loans by the SMEs was very slow because the funds were received when the harvest period had already started. Also, agro-dealers felt that by taking the loan they were going to make a loss when they factor in the cost of the loan interest at 17% of the loan in the selling price. They were buying hermetic bags at Tsh3,600 from the manufacturer and were selling at between Tsh4500 and Tsh5000 farmers. A recommendation was made for a 50:50 split for PHL technologies (50%) and other inputs to address margins and the seasonality of the product. In the initial contract, the loan was meant for PHL technologies only. The agro-dealers started demanding for a 30:70 split. According to Agnes, the adoption of new technologies in Tanzania takes a long time and most of the customers (applicants) were loan defaulters in other banks and therefore most of them did not qualify after their appraisals were done. The bank has been able to lend 27% of the total amount - $400,000. AGRA funds that are still with the bank attract an interest of 4% which is paid to AGRA’s account. They feel this rate is way too high for $ funds (use LIBOR rates).
For those agro-dealers who qualified for the loan, the money was remitted direct to the manufacturer of the PHL technology upon submission of pro-forma invoice. The other 50% was left in the agro-dealers account for use depending on need. Recommendations have been made to AGRA to extend the loans to other value chain actors such as aggregators and other value chain crops such as beans and rice but AGRA is yet to approve these proposals. This recommendation was in one of the quarterly meetings that was held on 23rd Aug 2019 with other consortiums such as Kigoma, Ihemi, and Kagera.

For TPB, some of the lessons learned from YieldWise Project is that the contract between banks and AGRA should have been more flexible to allow for amendments during the implementation of the project. Secondly, the loans should have been used to finance any technology that reduces PHL including threshers, and local artisans who fabricate these technologies. The contract was to promote PHL technologies which are very limiting. The banks should also have been allowed to use their experience in banking and lending to SMEs. It will also be helpful in future to have a bank officer present during farmer meetings and training to create awareness of the loan product and pass the correct message to the farmers. The communication to farmers about the loan product should be changed to let SMEs know that this is not a grant from AGRA but a loan from the bank targeting them. Lastly the interference of the government in the sector undermines the gains that were made by the project e.g the export ban and high taxes imposed in some of the PH loss technologies prohibits uptake of the technology. The government should also have regulations for risk and asset management that address issues specific to agriculture. Currently, regulations for normal lending that are used do not favour agribusinesses.

One of the successes realized by the bank is that the involvement with the project led the bank to engage with agribusinesses. The bank has a portfolio of 1.5 million customers or Tsh3 billion in Agriculture. From this portfolio only one loan was in default but has already been paid up. The project provided a platform for the bank to create awareness for other bank products and it expanded its market and regions where the bank was not present e.g., Singida and Lindi. The bank has expanded and now has 68 branches throughout the country.

8.2 Equity Bank, Tanzania

Key Informant: Rose Kitundu
Category: Financial Partner for PHL Technology – Revolving Fund
Equity was the first financial partner in YieldWise project when they signed a contract of 1.5 years in 2016. The same year the bank received $200,000 from AGRA with the bank required to provide an equivalent amount to make it $400,000. This was to be a revolving fund for lending to SMEs and agro-dealers for PHH technologies that included hermetic bags, silos and tarpaulins.

The loan did not perform well when it was introduced and the bank was able to disburse only 2 loans. This was because the bank was very lean in terms of coverage in Tanzania and did not have branches or staff in the areas where the project was operating. Secondly, Equity Bank’s staff as well as customers did not know about the product as it was still new in the market. The loan product was also not popular with the customers because it was meant to finance only PHH technologies which most agro-dealers said was not a profitable business due to its seasonality and had low margins. The banks requested AGRA to split the loan to 50:50 with 50% going to finance PHL technologies and the other 50% for other inputs to cover for the margins and seasonality of the PHL technologies. According to Rose of Equity Bank, AGRA agreed on the new arrangement but did not amend the contract to reflect the new arrangement, a situation that has raised audit questions for the bank from AGRA auditors. Agro-dealers have further asked for a 30:70 or 20:80 split of the loan for technologies and other inputs. Agro-dealers who got the loans pay equal monthly payments within a period of 6 months. This is not favourable for PHH because the technologies are mostly purchased at harvest time.
According to Equity Bank, the following lessons can be distilled from YieldWise Project. They said that the loan product should finance all levels of the value chain. It should be open to finance inputs, machinery, and equipment. AGRA should design a product according to market demand and supply. And that banks should be allowed to run their business so long as the technology is promoted, and funded.

Despite the ceiling of Tsh30 million (US$13,500) – Tsh50 million (US$22,700) that was placed as the maximum an agro-dealer could take as a loan cutting off many agro-dealers who wanted a bigger loan, Equity Bank has managed to lend Tsh.640 Million (US$290,000) to the SMEs and the Agro-dealers.

8.2 Tanzania Agricultural Development Bank (TADB)

Key Informant: 1. Eunice Mmbando – Business Development Manager
2. Rosemary Gordon – Senior Credit Appraisal Officer
Category: Finance Partner for PHL Technology – Matching Grant

Figure 15: TADB Offices in Dar es Salaam

Tanzania Agricultural Development Bank (TADB) was the third bank to participate in the YieldWise Project and had the role of supporting agro-processors at district level as well as regional level to enable them buy from farmers through matching grants. CSDI handed the bank a list of 11 SMEs that had been identified by CSDI/AGRA. Business plans were prepared for 10 of the SMEs that had qualified for the matching grants. The SMEs include Ruaha milling Company, Tanfeed International, Bam, Mama Seki group, Real World Ltd, Super Seki, Kibansa, Bomole Investments, London Agro-factory, and Tenende.

TADB was involved in the YieldWise Project after due diligence was done and AGRA changed funding criteria. The contract was negotiated between TADB and AGRA and product launched in January 2019. When reviewing the contract, two banks National Micro-Finance Bank (NMB) and
TADB were incorporated in the restructuring of the contract. NMB was to provide working capital loans and TADB was to provide CAPEX financing because their investments go for a period of 5 years while NMB was financing for a period of 3 years. The beneficiaries were never informed of the restructuring that was being done by AGRA and the banks and therefore did not understand the details of the contract. The sub-grantees were also not involved in the restructuring and this led to miscommunication between AGRA and the clients. The implementation agreement was signed with AGRA in 2019 for the bank to finance machines with a processing capacity of 30MT per 8 hours and storage capacity of between 500MT to 1000MT. For SMEs to qualify for the loans, they had to be in business for 3 years and must not be start-ups. TADB was to use the machinery or the equipment as security for a 70% CAPEX term loan, while the SME provided equity equivalent of 30% of the cost in cash or in kind. Then qualify for 30% matching grant that is equal to $80,000 for silos and $40,000 for machinery. The maximum for clients was $80,000. The matching grant was tied to the repayment. The money is paid directly to the supplier or vendor of the equipment.

TADB received $610,000 from AGRA whereby $30,000 was for consultants to review equipment pro-formas and provide reports. The balance of $580,000 was available for borrowing and operationalization of the grant. The bank was not allocated any money for administration of the loan product. The loan from TADB to borrowers attracts an interest of between 12% to 15%.

TADB had a challenge in operationalization of the grant. TADB had to open a separate account in the joint name of AGRA and TADB where all grant funds were deposited. A separate account was opened by the bank and was attached to the SME loan account which was in a different bank – Tanzania Investment Bank (TIB). Borrowers are asked to open accounts with TIB because TADB does not run operational accounts. TADB has already disbursed loans to Mama Seki and Real World Millers amounting to USD 62,000 for two milling machines that are being fabricated in Tanzania and a further USD58, 560 for Real World’s metal silos that are being imported from China. A total of USD351, 560 was approved for Real World. The bank has a pipeline of other off-takers and processors whose loan processing is at an advanced stage, totaling close to US$6.8 million, and include Tanfeeds International, Bam, Super Seki, Kibanza, Bomole Investments, London Agro-factory, Tenende and Ruaha Millers. This is more than ten times funds from AGRA.

Off-takers and processors delayed in putting together documentation that is required for loan appraisal by the bank. Documents such as certification from National Environment Management Commission; building permits from government and National Construction Authority (NCA); proforma invoices from suppliers etc are required for the loan to be approved. The ability of SMEs to put together this documentation required by the bank is mismatched. Also the processors have limited capacity to write fundable business plans and therefore have to outsource for this service which takes time and resources. There is need for a technical assistance (TA) fund to assist SMEs put together loan proposals and business plans for quick processing of the loans.
The following are the lessons from this loan product:

- Restructure the agreement between TADB and AGRA to accommodate reality on the ground and make it flexible
- Use this as proof of concept and bank will scale up.
- Equipment capacity should not be pegged to volumes that processors cannot meet.

TADB has appraised applications and will approve close to US$7 million to a pipeline of processors before end December 2019.

Appendix 9: Farmer Focus Group Discussion (FGDs)

9.1 Magagura SACCOS

- 21 people were present during the FGD of which 5 were women and 16 were men
- Magagura SACCRO has 305 members drawn from 3 divisions and 9 villages
The SACCO participated in YieldWise Project under RUDI. All the members who attended the FGD agreed that the project was helpful especially in training farmers on GAP and PH Management.

According to the chairman of the group, Mr. Batasa Komba, as a result of participating in the project, farmers were able to increase their yield from 5-8 100 kg bags per acre to between 18-24 100kg bags per acre. “We even have farmers like Mr. Maurice Moyo who have been able to achieve 35 100kg bags per acre”, said Komba. “This is because he used certified seed, the right fertilizer application, the correct spacing, planted early and did the correct crop husbandry. He also used the right PHL technologies to reduce losses”.

The members who attended the group discussion said that PHL has reduced by between 40%-50%, but the highest PHL remains at storage because farmers do not have proper storage facilities. PHL technologies such as PICS bags that were introduced to farmers through the project help at the household level because farmers are able to store their maize for domestic consumption for a longer period of time. Although the plastic silos are good and preferred by the farmers, they are not available in the market and the price is too high, hence most farmers cannot afford them. Problem with controlling rodents (rats) from destroying the hermetic bags.

The group said that their participation in YieldWise Project enabled them to aggregate their produce, access better markets and input financing through Forward Delivery Contracts. In the 2016/17 season, the project was very successful in its financing model; extension services were on time; farmers received their inputs early and were able to plant early, guaranteeing them a good harvest; guarantee for loan through the off-taker agreement was successful and they were able to pay back the whole loan of Tsh45 million that they had borrowed.

In the following season, 2017/18, the group started facing challenges with the market. They had borrowed Tsh.120Million from NMB and had signed a FDC with a floor price of Tsh346 per kg.
That year there was a bumper maize harvest in Tanzania and market prices dropped to as low as between Tsh180 – 200 per kg. The SACCO had aggregated 384MT of maize. The reason for the drop in prices is attributed to the export ban for maize from Tanzania that was imposed by the government. Farmers did not have alternative markets to sell their produce. The off-takers did not honour the contracts they had signed with the farmers, with most of them preferring to buy at market rates that were lower than the contract price. Magagura SACCOs was forced to negotiate the price and agreed to sell at Tsh240 per kg just to cover their cost of production and be able to pay their loan. The group had stored farmers produce outside for 2 months and this was escalating the cost of storage and exposing the produce to further PH losses. Some members decided to collect their produce and side sell. APECK International was the off-taker who agreed to off-take the produce. The money the SACCO was paid was not enough to pay the loan and the group was left with a debt of Tsh25M. APECK delayed in paying the farmers and therefore the bank charged a penalty of Tsh4M. (produce collected in November 2018 and payment made in April, 2019)

There was also insurance premium of Tsh3.843M that was deducted from their loans upfront but the group was not aware of it. The insurance was never activated when the markets collapsed and farmers were asking what its purpose was. Members were forced to look for alternative ways of paying the loans so that the SACCO can qualify for another input loan. Currently, they are facing another hurdle from the Ministry of Cooperatives whose rules stipulates that cooperatives should not borrow more than 25% of their savings. They have been told that they overstepped their limit and therefore cannot be allowed to borrow. They did not borrow in 2018/19 season.

Despite the challenges the SACCO faced, they are still engaging other financiers, off-takers and input suppliers. A positive from the project is that buyers such as APECK, Real World, and Ruaha have been approached for future engagement thereby expanding their market. This year due to poor harvest that was occasioned by poor weather and lack of inputs, the SACCO was able to aggregate only 20MT of maize which they have already sold. The current market prices of maize are at between Tsh600 – 700 per kg, which is good for farmers but they have no maize to sell. The training they received from YieldWise in GAP and PHH will help them to scale up their operations beyond project end. They value the training manuals they received.
Key Take Away Points:

- Evidence of Knowledge about high yielding seed Varieties, use of fertilizer and PH management;
- Farmers happy with the linkages created with off-takers and financial institutions;
- Weaknesses in forward delivery contracts that were never enforced that needs to be streamlined to mitigate risk to farmers;
- Storage infrastructure for farmers still a challenge - need for debt or grant financing to invest in storage facilities for FOs;

9.2 Kiwama SACCOs – Madaba, Songea

Membership: 261 of which 113 are Men and 148 are Women

30 Farmer Organizations form the Kiwama SACCO

15 members FDG 4 women and 9 Men

Figure 17: Members of KIWAMA SACCOS in Madaba

Kiwama stands for “Kikundi cha wakulima wa Madaba”. The SACCO has 261 members; 113 men and 148 women. 30 farmer organizations (FOs) from Madaba form this SACCO. The members who attended the FGD were all in agreement that YieldWise Project resulted in increased
productivity among its members from 5 100 kg bags per acre (500kg) to between 22-25 100kg bags per acre (2,200-2500kg).

Kiwama Sacco started working with YieldWise Project in 2016 when the project began. Before that, the Sacco was already aggregating maize and selling to buyers through the linkages that were facilitated by RUDI. During the farming season of 2015/2016, the Sacco received a loan facility of Tsh113,213,500 for inputs for 261 members and managed to clear all the loan in time. In 2016/2017 period, they took another loan for 1500 acres amounting to Tsh. 245,200,000 and in 2017/2018, a loan for 1900 acres amounting to Tsh. 478,800,000 which was also paid fully. During this season, the Sacco had a forward delivery contract with an off-taker (Apeck) to sell at Tsh380 per kg. The prices dropped to Tsh.270 per kg due to the bumper harvest in Tanzania that year and the government’s ban on exportation of maize. The off-taker (Apeck International) collected the aggregated produce from the Sacco but did not pay the bank (NMB) in time. The Sacco incurred a penalty of Tsh24 Million. The loan was for 9 months but Apeck paid after 13 months. According to the farmers, Apeck had promised to pay the penalty since he had the crop but never did.

In 2018/2019 season the Sacco took a loan amounting to Tsh376M for 1398 acres. The farmers reduced their acreage and also the weather was poor. The Sacco is still aggregating the produce from the farmers and so far have delivered to the off-taker, New Ezoye Enterprises Ltd, 612MT which represents 95% of the volume that is required for them to clear their loan.

Farmers acknowledged that forward contracts help in input loans but when market price drops below contract price then farmers are unable to pay the loans. Farmers are asking for an insurance product not only in production cover but price stabilization. FDC contract price of Tsh.280 per kg was arrived at based on production cost and 25% margin. At harvest they review market price and adjust the price. The problem is if contact price is higher than market price at harvest.

Late input delivery contributes to poor performance of production for farmers. Suppliers should take up responsibility when their inputs don’t perform. Some farmers said they had a problem with the performance of Bayer’s AUXOL that is used for post emergent weed control. They preferred Syngenta’s PimaGram but it was out of stock that season. Also Syngenta was accused of supplying expired seed to the farmers which led to poor germination and hence poor yields. They want input supply companies to be active in demonstrating their technologies before urging farmers to buy them in large quantities.

The price of PICS bags is also high but they said if given the opportunity, the SACCO is willing to aggregate farmers’ orders and purchase on their behalf so as to take advantage of the economies of scale.
“I congratulate this project because before it, I used to be a local farmer where I would farm on an acre and get five bags (500kg) and brag that I got a good harvest. After this project started, I’ve been able produce 25-27 bags on an acre (2,500-2,700 kg) because of the training I got in GAP. So I’m delighted by this project and my prayer is that the project does not stop because I really depend on farming. When we started we were very few but through this project I believe that the group will continue to increase in numbers because to date we represent 30 groups doing the desired maize farming”. – Mr. S. Rugongo

Key Take Away Points:

- GAP, Harvesting and PH Management skills acquired;
- It is possible to benefit from economies of scale and reduce production costs by adopting GAP, expanding acreage and building good relationships with buyers;
- FDCs enabled farmers to access inputs for farming. Combined with the knowledge acquired, resulted in increased productivity
- FO trying to upgrade storage capacities in order to aggregate more from farmers.
- Better knowledge of market trends
9.3 Kiponzeo Sacco – Iringa District

Membership: 104 members (Male: 58 Female 46)
Farmer Organizations: 4
Members Present during FGD: 6 members of which 2 were women and 4 were men.

Figure 18: Members of Kiponzero SACCOS in Iringa

Kiponzeo Saccos worked under BRiTEN in YieldWise project and were trained in GAP and PHH. The training included demonstration on how to use PICS bags and metal silos in PHL management. During the demonstrations, the technologies were sold to the farmers at a discounted price.

These technologies helped them to reduce their post-harvest losses by between 30% to 40% from the previous 60% PHL before they started using the technologies. The use of tarpaulins to dry, threshers to shell their maize and moisture meters to measure the moisture content of their produce has ensured that the maize that is aggregated is of high quality and attracts buyers. There is no manual winnowing as a result of use of threshing machines. They also have weighing scales which is better than using tins to measure when they are selling their produce to traders. Hermetic bags are used to store maize and beans for their home consumption. They said that they don’t use chemicals to preserve their maize because the hermetic bags are effective. They buy the bags from local agro-dealers at between Tsh4500 – Tsh5000 but during promotion by BRiTEN they bought at Tsh10,500 for 3 PICS bags and Tsh9,500 for tarpaulins.

The training in GAP has helped them increase their production from between 5 - 8 100kg bags per acre (500-800kg) to 15 – 20 100 kg bags per acre (1,500-2,000kg). Soil testing and demonstration plots was also carried out by BRiTEN. Farmers like the big demonstration plots at
the field schools where they are able to practically see the performance of the various seed varieties that are being demonstrated. They were also given small packs to try in their own farms. They felt the small packs should be used by farmers who have not used improved seeds before.

The SACCO has also been able to aggregate their produce and sell together. In 2017, they aggregated and sold together 59MT, while in 2018 they aggregated 79MT. In 2019 they have not been able to aggregate because farmers have no surplus produce for market. The SACCO had signed forward delivery contract with Ruaha Milling to sell their produce for Tsh402 per kg in 2017/18 season. The market price dropped to Tsh250 per kg. The SACCO had aggregated 79MT of produce but the off-taker collected and paid for only 29MT at Tsh300 per kg which went to off-set the input loan of Tsh31 Million that they had taken from NMB. They ended up selling the balance to brokers (‘walanguzi’) to pay the loan in full but they were still ripped off by the brokers, thereby never realized any profits. Brokers want to buy in bags and not in kilos. They come with their own bags which are bigger than the standard 100kg bags and force the farmers to fill their maize in the bags. The bags weigh between 130kg to 140kg but they pay the price of 100kg to the farmers. They said there are no law enforcement officers in rural areas to enforce the weights and measures laws.

Currently, Iringa Hope Foundation is providing input loans to the farmers and has provided the SACCO with a grant to construct a warehouse and offices.

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**Key Take Away Points:**

- *Knowledge about high yield varieties, GAP and PH management was gained*
- *Awareness about quality standards, market trends and prices was evident.*
- *Farmers appreciate the approach of demonstration plots used by YWS in training them on GAP. They preferred the ‘mother demo’ in the farmer field school.*

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9.4 Ihemi SACCO – Iringa District

FGD Group: 7 members (Male 6, Female 1)
Ihemi Sacco has received training from BRiTEN on GAP and PHL management through YieldWise Project. The demonstration plots that were established by BRiTEN helped farmers to know the seed varieties that are suitable for their area and those that do not rot on the tips, leading to high post-harvest losses. The farmers mentioned varieties such as Kibo Seed 614, Seed Co 634, Panner 625 among the seeds that rot at the tip. Soil testing showed soil was acidic. They added lime and productivity moved from 5 bags per acre (500kg) to 8-12 bags per acre (800-1,200kg) after liming.

The Sacco provides farmers with loans from their own savings to buy inputs. From 2015-2017 BRiTEN introduced them to the banks so as to access finances. They received Tsh49 million from NMB in 2016/17 farming season and repaid the loan after harvest.

During 2017/18 season, the Sacco took a second loan of Tsh12 million. The cooperative officers interfered in the process by adding groups from other areas who were not members of Ihemi Sacco and this posed a challenge for the Sacco in following up on loan defaulters. The Sacco still has a debt of Tsh.3 million to the bank. That season, they had a FDC with a floor price of Tsh.500 per kg, but market prices dropped to Tsh250 per kg. They renegotiated the price and managed to sell their produce to Musoma Foods Ltd who paid them Tsh430 per kg instead of the contract price of Tsh500 per bag. Farmers were able to pay the loan by doubling their deliveries to the Sacco, so the loan was paid in full. The rest of their produce was sold to NFRA.

In 2018/2019 season they were not able to access the loans because of the collapse in prices of previous season made loan repayment difficult. However, this year they have obtained a loan of Tsh14 million from Iringa Hope Foundation to purchase inputs for 2019/2020 season. The rate of interest for loans from Iringa Hope foundation is between 1-2 % per month for 6 months. Maize prices are very good this year at Tsh700 per kg but farmers planted less due to the challenges of previous year where they were forced to sell at a loss reducing the acreage under maize by 50%.

Some of the challenges the farmers said they are facing include fake seeds that are being sold on the market, lack of warehouses to store their cereals, and unavailability of lime in local agro-vets. They also said that the price of hermetic bags is prohibitive although they are effective in preserving maize. They are not able to get plastic and metal silos from local agro-dealer shops.
Magungu AMCO was introduced to YieldWise Project towards the end of the project but has benefitted immensely from the project. “The project opened our eyes through the training we received from RUDI”, said the AMCO’s chairman. RUDI trained Magungu AMCOs on GAP and PHH management. The AMCO received weighing scale, tarpaulin and moisture meter for their aggregation center. Farmers were sensitized and trained on the use of PHL technologies such as PICS bags and silos in the storage of maize. Technology promotion was done and they were advised where to buy the technologies.

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### Key Take Away Points:

- **Gained knowledge about high yield varieties, GAP, soil liming, and PHL Management;**
- **FDCs helped farmers access input loans and better markets;**
- **Upgraded their storage through a grant from Iringa Hope Foundation; hence can aggregate more volumes from farmers.**

#### 9.5 Magungu Agriculture Marketing Cooperative (AMCO) – Kiteto District

**Membership:** 132 (Male 86, Female 46)

**FGD Attendance:** 6 members - 1 woman, 5 men

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**Figure 19: Members of Magungu SACCOs in Kiteto**
They were also invited for a B2B meeting in Morogoro on market linkages towards the end of program and were linked to buyers who they said they are going to engage with in future to market their produce. This included NFRA with whom they had agreement to deliver maize but when they did their produce was rejected. They had to sell to other markets at low prices. They also had a contract with National Milling Corporation (NMC) to buy their produce at Tsh420 per kg but have never comeback to effect the contract..

They received input loan from TADB of Tsh46 Million but the inputs were delivered late and this resulted in poor crop performance. The delay was due to the process required for opening account with TADB. They were asked to open bank accounts with Tanzania Investment Bank (TIB) whose branches are in Dar es Salaam and Arusha hence too far and expensive for farmers. They have so far been able to pay Tsh21 Million and now cannot be able to access credit until they pay the balance.

An insurance cover was part of the loan agreement but farmers have not been compensated for the crop failure. They said they had insured 193 acres at an insurance premium of Tsh17,400 per acre with Mgeni Insurance Brokers. The insurance was to cover the farmer if production was less than 15 bags per acre – i.e the insurance would pay for the loss in yield...During the (2018/2019) season, there was a total crop failure in Kiteto region of Northern Tanzania. The insurance company never came to visit the farmers and conduct an evaluation. Instead they compensated farmers for fewer acres by paying them only Tsh 8 Million which was paid through the bank and went to offset the loan. Farmers were not given the insurance policy agreement, but were only told to sign on the dotted lines. They have an outstanding loan that is still accumulating interest rate of 10% and penalties from the bank. They have now asked for assistance from the cooperative officers for the bank to restructure the loan and spread it to the next season. They want an insurance cover from a credible company.

In input supply, Magungu AMCO is located in the remotest part of the Northern region and therefore farmers have limited access to agro-dealers. The distances to the nearest agrodealers are long and most of the agro-dealers have no financial capacity to stock inputs, PHH equipment and other machineries and equipment they need for farming. Some of these items that are needed are too expensive by the time they arrive to the agro-dealers. For example they said they need a hand pushed planter that has a capacity to plant 5 acres per day but have been asked to pay Tsh800,000( approx. US$365) for it to be delivered to them; where in other places it costs Tsh300,000 (US$136). Also hermetic bags are not readily available and the price is unaffordable at Tsh 4000 – 5000 per bag. They are willing to aggregate their orders if the manufacturers can supply to them direct so that they become the agents for them in their community.
Key Take Away Points:

- Knowledge about GAP, and PHL Management was gained through YWS;
- Experienced challenges with production insurance cover they had taken, but felt if handled with transparency, insurance can cushion farmers against risk;
- Land for farming is available, but farmers lack the financial resources to invest in mechanized farming and increase acreage;
- There was evidence of some off-takers like Mema Holdings providing embedded services to some reliable farmers or FOs including providing inputs and training farmers in GAP.

9.6 Engusero AMCOS Limited – Kiteto District

Membership: 158 (Male 98, Female 60)

Figure 20: Members of Engosero SACCOS in Kiteto

Engusero AMCOS were involved with YieldWise Project towards the end of the project. They have received training in GAP and PHL technologies. They were also provided with tarpaulins, moisture meter and weighing scale. They have rented a community warehouse which is being used as an office as well as a warehouse for the AMCO.

PHL technologies that were demonstrated to the farmers through YieldWise Project are not available with the agro-dealers locally therefore farmers have not been able to use them. The AMCO is willing to become an agent or distributor of the hermetic bags because they said they
have the members who they can sell to and also other community members who are not in the cooperative.

The project linked the AMCOS to buyers but there was no contract that was signed between them and the buyers. The buyers had agreed to come and buy from the cooperative after aggregating farmers’ produce for 2017/18 season but did not turn up. They had consolidated 396- 100kg bags (39.6MT) that year but when there was no market for maize that year because of the government’s export ban on maize leading to collapse in market price. They ended up selling their 183 100kg bags to NFRA at Tsh420 per kg. The other 100 bags were sold at Tsh320 and the rest at Tsh300 per kg to alternative buyers. They said they have been sensitized on insurance but no insurance cover has been taken. This season 2018/2019, they did not plant maize but planted sunflower.

They have received a loan of Tsh200 Million from NMB for sunflower production. This is the first loan the AMCO has received for crop production. Farmers did not grow maize in the area because of the poor yield they got in the previous year. Climate change has made maize growing risky, while sunflower is more drought tolerant.

According to the manager of the AMCOs, farmers need to come together so that they can have a voice to advocate for policies that can favour them and help them increase production and access inputs, markets and financing.

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**Key Take Away Points:**

- Gained knowledge in GAP and PHL Management
- No Agrodealers to supply them with the technologies
- Climate changes have made maize farming risky; have opted to grow sunflower because it is drought tolerant.

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9.7 Shirimungani AMCOS – Moshi, Arusha

Membership: 200 (Female 105, Male 95)
Shirimungani AMCOS is among the few AMCOS that are thriving after receiving training in Agriculture as a business from RUDI through the YieldWise Project. The AMCO deals with maize, beans, rice, sunflower and ground-nuts value chains. They offer the following services to farmers:

- Aggregation of input orders for collective procurement. They consolidate orders from members for fertilizer and seed and buy as a cooperative hence able to receive wholesale prices and help farmers save on input costs. YARA agrees to sell them at wholesale price if they can give an order of 10 tons. Seed varieties that are bought include Meru Agro 515 and 513; Seed-Co 627 and 513; Syngenta 514 and are distributed to farmers according to the different agro-ecological zones. They also sell PICS bags to members at Tsh4500 and are able to get a commission from the supplier that is treated as a revenue stream for the AMCO;
- Aggregation and storage of farmers’ produce;
- Marketing produce on behalf of farmers;
- Financial services like lending to farmers and linkages with other finance service providers like banks and micro-finance institutions;
- Value addition – processing and sale of finished products; the AMCOS is investing in a processing plant for maize. They have a machine for rice processing that has a capacity of 1 ton per hour
- They provide machinery and equipment hire services to farmers at a fee. The AMCOS owns a threshing machine that was provided by RUDI. There are very few service providers for machinery and equipment in the area and therefore the AMCO saw the opportunity to provide the service to farmers. Gap exists in tractors hire especially for mechanized land preparation and transport of farmers’ produce.
The AMCOS was trained by YieldWise Project on GAP and PHL Management during which hermetic bags were distributed, received 8 plastic silos and 3 metal silos, weighing scale and moisture meter. Tarpaulins were promoted but the AMCO did not receive any from the project. They were able to buy their own. After PHH training, farmers are able to prepare their produce at home – they clean, dry to the recommended moisture level – and when they are ready, the AMCO contacts the buyer who comes to pick the produce from the warehouse. The maize does not stay for long in the warehouse. When they sell to alternative buyers, they pick the maize together with the bags but anchor buyers provide their bags to farmers to pack the maize. In 2016, the AMCOS had a forward contract with NFRA for a price of Tsh580 per kg. They aggregated 37MT that was collected from their stores by NFRA. They had taken input loan of Tsh32Million from NMB. YARA, Seed-Co and Bayer Ltd delivered to the AMCO after getting their aggregated order. The AMCO had deposited 20% of the value of the order at their bank account. Farmers picked their required inputs from the AMCO. The loan was paid fully after the harvest and maize was delivered to the buyer. The AMCO acted as agent of the bank, after selling the aggregated produce, they paid the bank loan and the balance was paid to the farmers. There was no forward contract. In 2017 they sold to alternative buyers from Kenya. That year prices collapsed. In 2018 they sold to Harsho Group (Processor) 30MT at Tsh420 per kg. In 2019 there was poor harvest and therefore farmers did not sell produce through aggregation.

We benefitted a lot from the trainings by YieldWise Project. After being trained we applied the knowledge we got from maize farming to rice farming. We have been trained on how to grade rice and now we have acquired the machine for grading so that we can get better prices from the market. – Gasper Joseph Massawe

Key Take Away Points:

• Business oriented AMCO that proves that AMCOs can offer various services to farmers including aggregation of input orders; aggregation and storage of produce; marketing of produce; selling PH technologies to farmers; lending to farmers; value addition; and service provider for equipment e.g threshing services at a fee
• Value addition of maize and rice milling improves the returns instead of selling raw produce
9.8 King’ori SACCOS – Meru District, Arusha

Membership: 387 (Female 112, Male 276)

Figure 22: Officials of Kingo’ri SACCOS in Arusha

King’ori SACCOS was formed in 2007 as a group with the aim of bringing farmers together to help each other in times of need. In 2009 they started lending money to members from their own savings so that they can buy inputs for farming and engage in other businesses. Currently the group has 387 members of which 112 are female and 276 are male. To join the group a person pays an entry fee of Tsh 5000. Each member is entitled to a minimum of 5 shares and a maximum of 10 shares at Tsh10,000 per share. The SACCOS provides loans to members based on the savings they have in the SACCOS. These savings earn an interest of 4% while if one takes a loan they are charged 3% per month on reducing balance. Maximum loan period is 12 months but one can borrow and pay within 4, 6, 9, or 12 months. A member is also allowed to open a general account in the SACCOS where he/she can save his/her own money, but attracts no interest.

In YieldWise Project, the group was trained in GAP and PHL Management. The training in GAP helped farmers to increase their yield from between 5 – 7 bags per acre to between 15 – 20 bags per acre. The group received PHH technologies including tarpaulin, moisture meter and weighing scale. They also got 4 metal silos with a capacity of 5 bags (500kg). Farmers have been buying and using PICS bags because they are supplied on credit to the SACCOS by the supplier. The SACCOS sells to farmers and pays the supplier.

Under YieldWise, the SACCOS was linked to input suppliers and has been taking input loans on the strength of the forward contract they sign with off-takers like Union Service Stores Ltd (USSL) and NFRA. They deposited 20% of the cost of aggregated inputs with the bank and were able to get loan from NMB bank of Tsh28 million. They prefer working with NFRA because they are the best buyers. Only problem is that the SACCOS has to deliver their produce to NFRA’s warehouses. They had forward contract with NFRA from 2014 to 2018 at a price of between Tsh470 – 500 per
kg and these FDCs enabled them to access input credit from the bank. In 2018/2019 season the harvest was poor due to flooding after too much rain in the region. The SACCO has not finished paying the Tsh28 Million they had taken from the bank. There is an outstanding balance of Tsh15M. This year they have not been able to aggregate and sell together because farmers don’t have maize. They proposed for the incorporation of production insurance in future financing models so as to cushion farmers from weather risks. USSL has been coming to buy maize from individual farmers who have maize at between Tsh700 to Tsh800 per kg and pays after 7 days.

The group is currently selling seed from Meru Agro to farmers and gets a commission of Tsh1000 per 10kg of seed sold.

The challenges of late payment forces farmers to side sell to brokers who use ‘debes’ tins to measure instead of weighing scale.

Farmers also have a challenge of accessing some of the PHH technologies because they are not available in local agro-vets. Some of them still dry maize on the ground because they cannot get tarpaulins locally.

They said there are fewer service providers to provide services like mechanized farming. Tractors are few and on high demand and this delays land preparation and ability to increase area under cultivation of maize. They also don’t have service providers who can provide threshing services to farmers and therefore threshing delays delivery to the market. There is an opportunity for mechanized farming and the SACCO is planning to invest in a tractor that they can use to provide these services to their members and other farmers in the area. They said that the tractor is useful because it can be used for land preparation, threshing as well as transporting produce from farmers’ stores to the AMCO’s store.

The group is collaborating with a group from Nelson Mandela University to put up a processing plant for fortified maize flour. They have been trained by the university on how process maize flour and the university is providing them with the processing machine with a capacity of 10 MT per day as a grant. The AMCO was required to register a separate business group (Kimusati), of 40 members that will be tasked with running the processing business. The members of this ‘Kimusati’ have contributed Tsh50,000 each as their investment in the business. The money was used to renovate the premises that will house the machines and installation of electricity in the premises.
Key Take Away Points:

- High demand for mechanization. Lack of fewtractors delays land preparation and the ability to increase acreage under crop.
- Lack of threshing services delays delivery to market. Opportunity exists for investment in mechanized farming.
- Value addition of maize will provide the SACCO with a new revenue stream
## Appendix 10: List of Participants in the YW Lessons Learnt Study

### List of Organizations and Individuals who Participated

<table>
<thead>
<tr>
<th>Key Informant Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name of Organization</strong></td>
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<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>1 Center for Sustainable Development Initiatives (CSDI)</td>
</tr>
<tr>
<td>2 Building Rural Incomes Through Enterprises (BRiTEN)</td>
</tr>
<tr>
<td>3 Rural Urban Development Initiatives (RUDI)</td>
</tr>
<tr>
<td>4 Real World Limited (Songea)</td>
</tr>
<tr>
<td>5 Ministry of Agriculture - Songea - Ruvuma Tanzania</td>
</tr>
<tr>
<td>6 Alpha Agrovet - Iringa</td>
</tr>
<tr>
<td>7 MEMA Holdings</td>
</tr>
<tr>
<td>8 Union Service Stores</td>
</tr>
<tr>
<td>9 Tanzania Post Bank (TPB)</td>
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<tr>
<td>10 Equity Bank Tanzania Ltd</td>
</tr>
<tr>
<td>11 APECK International Ltd</td>
</tr>
<tr>
<td>12 Tanzania Agricultural Development Bank (TADB)</td>
</tr>
<tr>
<td>13 TABE Agrovet</td>
</tr>
<tr>
<td>14 A to Z Textile Mills Ltd</td>
</tr>
</tbody>
</table>

### Farmer Focus Group Discussions (FGD) Participants
<table>
<thead>
<tr>
<th>Name of FO</th>
<th>Name of Key Persons (Contact)</th>
<th>Position</th>
<th># of Participants in FGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magagura SACCOS - Songea</td>
<td>Naltazar Komba - 255623327118</td>
<td>Chairperson</td>
<td>16</td>
</tr>
<tr>
<td>KIWAMA SACCOS - Songea</td>
<td>Henry Kibata</td>
<td>Secretary</td>
<td>9</td>
</tr>
<tr>
<td>Kiponze SACCOS - Iringa</td>
<td>Jackson Msilu</td>
<td>Secretary</td>
<td>4</td>
</tr>
<tr>
<td>Ihemi SACCOS - Iringa</td>
<td>Yuda Nyalusi</td>
<td>Treasurer</td>
<td>6</td>
</tr>
<tr>
<td>Magungu AMCOS - Kiteto</td>
<td>Julius S. Mwedimage</td>
<td>Chairperson</td>
<td>5</td>
</tr>
<tr>
<td>Engosero AMCOS - Kiteto</td>
<td>Vincent Mnyagwila</td>
<td>Manager</td>
<td>4</td>
</tr>
<tr>
<td>ShiruMungani AMCOS - Moshi</td>
<td>Rehema Fabiani Chuwa</td>
<td>Secretary</td>
<td>4</td>
</tr>
<tr>
<td>Kingo’ri AMCOS - Arusha</td>
<td>Regea Eli John Sarakike</td>
<td>Founder and Asst. Chairperson</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>50</strong></td>
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<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td>50</td>
<td>15</td>
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</table>
Appendix 11: Core Processes in Maize Value Chain

As indicated below, many actors are likely to be found taking part in activities as one climbs higher up the maize value chain. Farmers who are the weak link are involved in farm level production processes where the core processes include input procurement, land preparation, planting, weeding through to harvesting, storage and marketing of produce as raw products for processors or as grain to consumers to be used as food.

![Figure 23: Value Chain Actors and their functions](image)

<table>
<thead>
<tr>
<th>PRODUCTION</th>
<th>STORAGE AND HANDLING</th>
<th>PROCESSING</th>
<th>Distribution and Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTORS:</strong> Farmers, input suppliers</td>
<td><strong>ACTORS:</strong> Aggregators/Assemblers, Traders, Transporters, NFRA</td>
<td><strong>ACTORS:</strong> Posho millers, Medium Scale Millers, Large Scale Millers, Food Processors, Animal Feed Processors</td>
<td><strong>ACTORS:</strong> Individuals, Schools, Community, Institutions, Wholesalers, Retailers, Supermarkets</td>
</tr>
<tr>
<td><strong>CORE PROCESSES:</strong></td>
<td><strong>CORE PROCESSES:</strong></td>
<td><strong>CORE PROCESSES:</strong></td>
<td><strong>CORE PROCESSES:</strong></td>
</tr>
<tr>
<td>- Input procurement</td>
<td>- Marketing</td>
<td>- Cleaning</td>
<td>- Packaging</td>
</tr>
<tr>
<td>- Land preparation</td>
<td>- Market Information</td>
<td>- De-stoning</td>
<td>- Storing</td>
</tr>
<tr>
<td>- Planting</td>
<td>- Assembling/Bulking</td>
<td>- Drying</td>
<td>- Marketing</td>
</tr>
<tr>
<td>- Weeding</td>
<td>- Drying</td>
<td>- Fumigating</td>
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<tr>
<td>- Fertilizer Application</td>
<td>- Sorting/Grading</td>
<td>- Milling into flour and feed</td>
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<tr>
<td>- Pest and Disease Control</td>
<td>- Fumigating</td>
<td>- Packaging</td>
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<tr>
<td>- Harvesting</td>
<td>- Weighing</td>
<td>- Storing</td>
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</tr>
<tr>
<td>- Transporting</td>
<td>- Bagging/Packaging</td>
<td>- Marketing</td>
<td></td>
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<tr>
<td>- Storage</td>
<td>- Transporting</td>
<td></td>
<td></td>
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<tr>
<td>- Marketing</td>
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Figure 23: Value Chain Actors and their functions
Appendix 12: Maize Production Variable Costs Analysis

An analysis of the variable costs incurred by the farmer when planting 1 acre of maize is shown in the table below. This example was taken from FDC contract that was signed by AMCOS from Kiteto Region in Northern Tanzania. About 39% of costs are labour related and 49% relate to inputs costs. As can be seen the greatest costs incurred by the farmer is costs of fertilizer (Planting) at 16% of costs, and Top Dressing at 16% of all costs. If the farmers sell at Tsh380 per kg. they will make a gross margin of 31% as illustrated below.

Table 11: Production Cost Analysis

<table>
<thead>
<tr>
<th></th>
<th>Variable Costs (1 Acre)</th>
</tr>
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<tbody>
<tr>
<td><strong>Labour Costs</strong></td>
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<tr>
<td>Land Preparation</td>
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<td>Clearing</td>
<td>10,000 Tsh</td>
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<td>Ploughing</td>
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<td>Harrowing</td>
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<tr>
<td>Planting</td>
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<td>Ist Weeding</td>
<td>20,000 Tsh</td>
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<tr>
<td>2nd Weeding</td>
<td>10,000 Tsh</td>
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<tr>
<td>Top Dressing</td>
<td>15,000 Tsh</td>
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<tr>
<td>Harvesting</td>
<td>20,000 Tsh</td>
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<tr>
<td>Threshing/shelling</td>
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<tr>
<td>Drying/Packaging and Pesticide Application</td>
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<td><strong>Sub-total</strong></td>
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<tr>
<td><strong>Input Costs</strong></td>
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<td>Certified Seeds</td>
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<td>Fertilizer - Planting (50kg per 1 acre)</td>
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<td>Fertilizer - Topdressing (50kg per 1 acre)</td>
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<td>Packaging Bags (Tsh 1000 X 15 pieces)</td>
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<td>Storage Pesticides</td>
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<td><strong>Sub-total</strong></td>
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</tr>
<tr>
<td>Transport (from farm to store)</td>
<td>30,000 Tsh</td>
</tr>
<tr>
<td>Miscellaneous Costs</td>
<td>20,000 Tsh</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>50,000</strong> Tsh</td>
</tr>
<tr>
<td><strong>Total Variable Costs</strong></td>
<td><strong>435,000</strong> Tsh</td>
</tr>
</tbody>
</table>

Production Cost per 100kg bag (=435,000/15) | 29,000 Tsh |
Production Cost per kg (=29000/100) | 290 Tsh |
FDC Price per kg with Off-taker | 380 Tsh |
Gross Margin (%) | 31%
Appendix 13: Maize Value Chain Map and Actors

Figure 24: Value Chain Map

MAIZE VALUE CHAIN MAP – ACTORS AND THEIR FUNCTIONS

Consumption

- Overall Country Consumption
  - Individual Consumers
  - Schools, Institutions,

Distribution

Processing

- Small and medium Scale Millers: Tandale Market millers, Ruaha Milling Co, Real World etc

Trading

Storage

Bulking/Collection/process

On Farm Storage

Farm Level Production

Production Inputs

PHH Technologies

Export Market – Kenya, Malawi, Zambia, Rwanda, DRC

Retail Outlets: supermarkets, Kiosks

Large Scale Millers and Food Processors: Union Service Stores, National Milling Cooperation

National Traders e.g. NFRA, APECK International, Export Trading, Musoma Food Ltd etc

Aggregators- Ruaha, Real World, Union Stores,

Surplus Small Scale Farmers: 70 farmers interviewed

AMCOS, Farmer Organizations, Farmer Aggregators

Input Suppliers – Alpha Agrovet in Iringa, TADE agrovet in Arusha, A to Z, YARA, Meru Agro

YieldWise Project AMCOs – Magagura, Kiwama, Ihemi, Kiponzero, Magungu, Engusero, Shimungani, King’ori

Overall Country Consumption

Figure 24: Value Chain Map