

Transforming the Uganda Maize System

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The Setting

The Paradox of the Starving Farmer

Of the estimated 850 million seriously undernourished people in the world, three quarters live in rural areas dependent on small scale, traditional agriculture. In sub-Saharan Africa, about 20% of the population is acutely malnourished and lives in extreme poverty while trying to subsist on agriculture. In Uganda, over 70% of the population depends on agriculture, usually eking out a precarious subsistence from tiny plots of land. Despite growing food crops such as maize, about 10.7 million people or 30% of the total population are suffering from severe undernourishment. About 39% of children experience stunting due to poor quality food. They are caught in a trap where the lack of resources limits their ability to produce and sell enough of a surplus, which in turn is needed to invest in improving and expanding the farm as well as meeting other critical household needs.

At the same time, food companies and supermarkets in growing urban areas, often owned by major multinationals, import a very high percentage of the products they sell because the quality, cost and reliability of local products is so poor. Although Uganda imports 18% of its cereals, up from 2% in 1990, the import dependence among “modern” food companies is very high. Net imports of cereals in 2010 were about 400,000 tons. Western food and beverage companies are increasingly being pressured to commit to more local and “sustainable” sourcing, but putting this into practice is a formidable challenge.

This case study is connecting these two worlds: One, of modern food and beverage companies with extremely high standards for quality and food safety with urban customers demanding the lowest possible prices; the other, of extremely fragmented and poor farmers

cut off from these markets by poor infrastructure, inefficiency and bad quality. For the modern food companies, the challenge of organizing and upgrading the supply chain at a cost that makes business sense seems formidable. Poor farm households, trapped in poverty and daily survival, cannot even begin to think about how to meet demanding market requirements. This case is about bridging the enormous gap between these two worlds. How can companies integrate smallholder farmers into their supply chains in a way that is commercially viable while also providing these small-scale food suppliers with a pathway out of poverty and hunger?

This case study looks at a proof of concept project for modernizing the traditional small farmer system and bringing it into the supply chain of a sophisticated company. It does so through an organizational model that is both commercially viable and sustainable. After introducing the key actors and the systemic challenges they faced in 2009, the case study looks at the pathways for creating economic and social value. Of critical importance is the emergence of a trader that transforms itself into a new type of supply chain manager, investing in backward linkages to the farmers and forward linkages to the end buyers. Systemic change leads to surprisingly fast response by the farmers which in turn creates value for all actors in the system. Measures of economic and social value are provided in the case study.

Meet the Key Actors

By 2009, Nile Breweries Ltd. (NBL) had doubled the capacity of the Jinja plant in South Eastern Uganda since its acquisition by SAB Miller five years before. Like most modern food and beverage companies in Africa, the company imported most of its agricultural raw materials. Before 2009, for NBL this was 65% of the 15,000 tons of raw materials required. Purchasing within Uganda was extremely

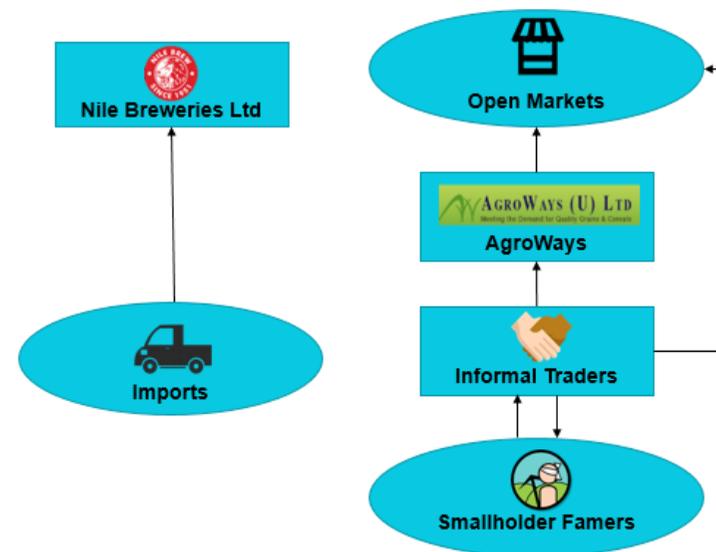
difficult given the very inefficient and fragmented agricultural sector and the company's food safety, quality, volume, reliability and pricing requirements. However, the Ugandan subsidiary was also required to embrace the parent company's Sustainable Development program, which called for an effort to substitute imported materials. Use of local inputs was also incentivized by government policies which reduced taxes on beer produced with local materials. NBL had initiated trials to source maize and maize grits as a beer adjunct, but results were poor due to the low quality of the maize.

On the supply side, farming communities in the Busoga region surrounding Jinja and the NBL plant were struggling in extreme poverty with annual household incomes ranging between \$316 or \$0.87 per day.¹ Maize was the most important food crop for families and the source of about half of the family cash income. The average smallholder family struggled with an average of 1.4 hectares of land farmed traditionally with very low productivity. Farmers with urgent cash needs and limited surplus maize were forced to sell right after harvest at low prices to traders who would then sell maize flour back to the community during the "hungry" dry season at several times the price initially paid for their maize grain. The lack of post-harvest handling equipment meant that farmers had no ability to manage the quality of their product. Poorly handled maize with high moisture can lead to aflatoxin, which is highly toxic and associated with stunting in children. An estimated 30-40% of grain was lost due to poor post-harvest handling, while much of the rest failed to meet minimum grading standards required by buyers such as Nile Breweries. This lack of local infrastructure meant that traders would buy maize at the lowest possible price, which in turn discouraged investment in modern maize production.

The gap between NBL's requirements and the reality of the traditional maize system was clearly enormous. Into this space stepped

¹ Data is from a baseline survey of UVAMA farmers.

AgroWays (U) Ltd., a small grain trading company established in the Jinja area. It was the first licensed Warehouse Company in Uganda in 2006 and handled maize, beans and rice. Its 5,000 metric tons (MT) Grain Bulking Facility (GBF) was still relatively small and rudimentary, but located very close to NBL, which made it a logical customer. In 2008, AgroWays made a proposal to NBL for supplying maize and received an initial order for 40 MT per month. The company had cleaning and drying capacity for 5 MT per day, but lacked the equipment needed to efficiently de-germ maize and produce the maize grits sought by NBL. In order to supply more to NBL it would have to start purchasing from the smallholders in the region, but their maize could not even meet the lowest quality grade. As shown in the figure, the question was how to transform the traditional system, bringing the small farmers and AgroWays into a direct and growing relationship with NBL in ways that all three actors would benefit.



In this context Palladium², an implementer of international development solutions, submitted a proposal to the US Agency for International Development (USAID) to test out a hypothesis.³ Their theory was that strengthening linkages of intermediate supply chain managers like AgroWays could create enduring positive impact benefitting all of the actors in the system. By working backwards from market opportunities (such as those presented by NBL), progressive intermediate companies like AgroWays could benefit commercially if they invested in developing direct relationships with their farm suppliers. Doing so would also incentivize improvement in productivity and post-harvest quality management needed to meet the requirements of sophisticated customers. The key to success was for each actor—farm supplier, intermediate supply chain manager and end customer—to perceive clear economic value, and in the case of farmers, social benefits.

The first phase of Palladium's work with USAID was known as the Market Linkages Initiative (MLI). This two-year pilot focused on building new types of relationships between traders and farmer communities in seven countries of Eastern Africa and provided the Common Market for Eastern and Southern Africa (COMESA), building evidence and documentation to popularize such initiatives. Seven matching grants were provided to trading companies in Uganda willing to co-invest in local storage and basic post-harvest handling equipment at the community level. The grant to AgroWays was the largest and most successful.

Charles Mulagwe, the Palladium project manager in Uganda, recalls that AgroWays owner Herbert Kyeyamwa was at first sceptical and cautious about participating in the program and investing at the village level, worrying that farmers would not change from traditional ways or reliably sell to AgroWays, allowing them to recoup their investment. Reflecting back, Mr. Kyeyamwa says he was motivated to participate

in the MLI project to solve two problems: 1) poor quality, high losses, and subsequent rejection on grain they were supplying; and 2) rapidly growing NBL procurement requirements that would require higher productivity within the AgroWays catchment areas.

AgroWays received a grant of \$299,000 to support its own \$740,000 investment. This investment went towards establishing eight Village Aggregation Centers (VACs), improving a Grain Bulking Facility (GBF) by upgrading intake, cleaning and drying equipment, and buying additional silos and enhanced equipment such as moisture meters and modern weighing scales to improve transparency. By 2010, AgroWays had already doubled the number of its smallholder suppliers in the Busoga region from 2,625 to 5,700. Local farmers benefitted from both higher prices for their graded maize and from an additional price premium of UGX 20 per kg for selling to AgroWays. Because AgroWays was licensed by the Uganda Commodity Exchange, it could also offer farmers access to credit through a warehouse receipts program at its GBF. From the AgroWays perspective, improved quality, reliability and volume allowed them to focus on Nile Breweries as a high-value customer. AgroWays soon became an approved supplier to NBL by meeting NBL's quality standards, gaining access to price incentives for meeting the higher grades. Nile Breweries also asked for fine maize grits, which would simplify the beer conversion process and thus their ability to replace imports.

Given the success of the two year pilot, Palladium and AgroWays, with support from Nile Breweries as the offtaker, agreed to request \$2.7 million in additional match funding from USAID for a three-year program known as the Uganda Value Added Maize Alliance (UVAMA). With this, AgroWays invested in new silos at the central GBF in Jinja and developed a new GBF and supply chain in Western Uganda to serve NBL's new brewery. Additionally, AgroWays invested in modern equipment that enabled them to process maize into grits, with by-

² At the time, it was CARANA Corporation.

³ With its Feed the Future Initiative, one of USAID's strategic priorities was to overcome food insecurity and poverty in rural Africa.

products of fine and clean maize germ and bran. Palladium and the UVAMA grant concentrated on supporting farmers with good agronomic and post-harvest handling practices. In particular, UVAMA provided farmers with relevant equipment to reduce post-harvest losses and constructed three VACs in strategic locations, connecting Agroways with more impoverished small-scale farmers.⁴

This case study is structured to assess the following questions:

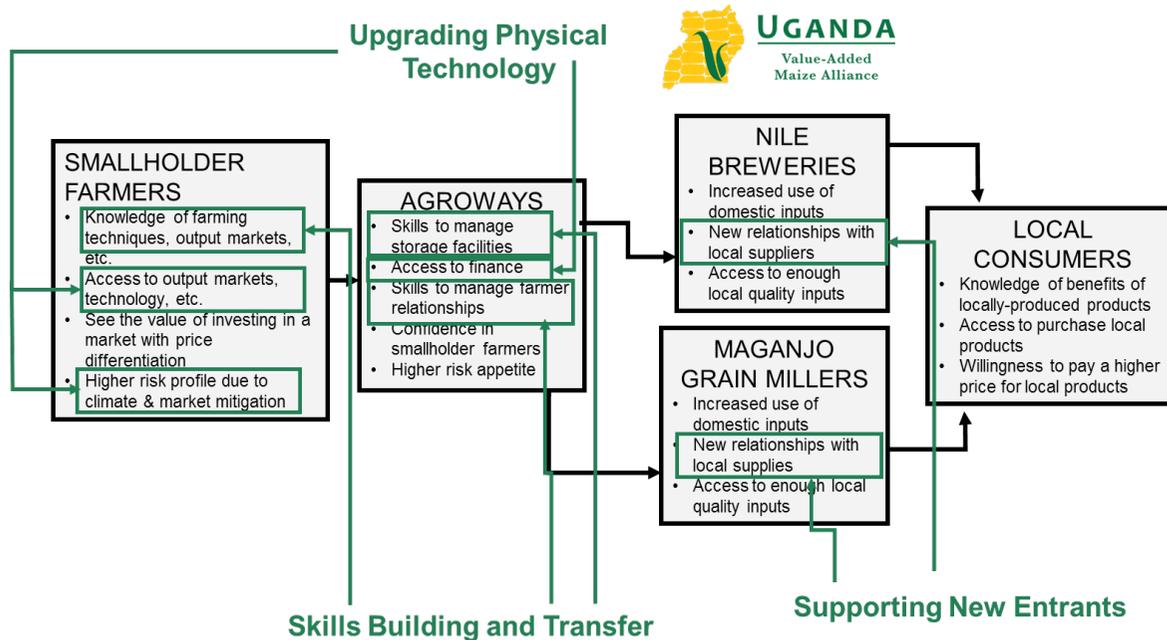
1. What has changed in the maize system, NBL's supply chain, and the relationships/behaviours among the key actors? Why?
2. What and how much economic and social value has been created? How is this distributed among all the actors?
3. Is this system now commercially sustainable and scalable?
4. What are the lessons learned for further improvement and similar programs?

Pathways to Creating Economic and Social Value

The table below highlights the change initiatives that needed to occur to move each actor toward achieving their desired outcomes.

	BASELINE SITUATION	CHANGE PROCESS	DESIRED OUTCOMES
NILE BREWERIES	Import of raw materials for brewing, including barley, sorghum, maize and cassava Conversion of maize into grits, starch and syrup	Sustainable sourcing program as a business proposition (not corporate social responsibility) Certification of qualified supplier with guaranteed offtake for maize grits and Class 1 and 2 maize	Local sourcing of materials Reliable partner for other regions/ commodities Reduction in brewing time
AGROWAYS	Lack of sufficient Class 1 and 2 grade maize from farmers Weak linkage to NBL and ability to meet their quality and growth expectations No value-adding services at village or GBF level	Certification as approved NBL supplier Village level storage, drying, grading, training and market information Farm gate pricing based on quality and grading Value-added processing (grits, germ) Improved farmer access to quality inputs	Sourcing from higher % of farmers in catchment area Higher yields and production and higher % of Class 1 & 2; lower rejection rates Expanded commercial relationships with NBL and other customers, including expansion into other regions (\$ of sales)
FARMERS	Extreme poverty Food and nutrition insecurity Lack of inputs and know-how to improve yields High post-harvest losses and no negotiating power	Collaboration with trader on local storage and PHH Training in improved practices Access to credit for inputs Access to market information	Higher yields sold for better prices (increased income) Improved household nutrition
USAID	Ambitious targets for reducing food insecurity and poverty not realized through traditional approaches	Funding structured to incentivize private co-investment in new solutions Contract Palladium as technical implementer/facilitator	Improved food security for both farm and urban households

⁴ Other actors were brought into the Uganda Value Added Maize Alliance (UVAMA). These include Maganjo Grain Millers to develop nutritious food products using maize germ and bran (to be purchased from AgroWays) and the Grameen Foundation to test SMS based price and market information. However, to avoid excessive complexity, these are not featured in this case study.



At the project outset, each of the actors had opportunity and motivation for change. However, they lacked the vision for how this could occur, especially due to rooted mistrust for the other actors in the system. For companies such as NBL and AgroWays, the perceived cost of the “change program” may have seemed high, especially with scepticism about the likely outcomes. USAID funds represented a kind of seed capital for de-risking an initial proof of concept, with Palladium acting as a facilitator and program manager. One of the key objectives was to prove to firms like NBL the benefits of partnering with companies like AgroWays in local supply chain solutions. Specifically, UVAMA sought to prove that enough value is created through these supply chain linkages to generate clear economic returns with an enduring, scalable and replicable business model. Additionally, the farmers’ economic returns—which result in improved nutrition, ability to pay school fees and greater household resilience—become NBL’s social returns.

Value Creation in the System

As shown in the figure below, UVAMA is creating value that benefits all the participants in this alliance through three principal processes:

- Supporting improved access to markets for existing actors and new entrants, thereby helping the actors rethink their business models to capture new opportunities;
- Upgrading physical technology and practices for improved productivity, efficiency and value addition;
- Improving knowledge and skills of actors in the system to work differently and interdependently



Access to New Market Opportunities as a Key Driver of Change

Poor market linkages and subsequent lack of market opportunities for various actors were both key weakness in the Uganda maize system.

At the outset of the program, the majority of the small-scale farmers dried their maize on bare ground, with domestic animals and poultry moving through it. Few would bother to take their maize to AgroWays because they were sure of rejection. Instead, farmers' principal market outlet was informal traders who would buy the maize at very low prices and sell on to other traders and back to villagers as maize flour at much higher prices in the dry season. In 2009, AgroWays primarily purchased from these traders and larger, more commercial farms that could meet its minimum quality requirements, and in many cases also bring the maize to their GBF. AgroWays partnered with the MLI and UVAMA programs to spur growth and establish direct purchasing relationships with thousands of smallholder farmers, helping them produce higher volumes of Grade 1-2 quality maize.⁵

Maize is only graded after cleaning and drying to 13.5% moisture content. At the farm gate, farmers can be paid as low as UGX 400/kg by the bicycle traders who state that their maize is of poor quality. In the July-September 2016 season, AgroWays paid an average of UGX 930/kg for Grade 1 and 2, usually UGX 20 more for Grade 1 than Grade 2, and UGX 30 above the open market price for graded maize. In 2016, a survey indicated that UVAMA farmers received 11% higher prices from AgroWays than from other traders, but that all buyers were paying about 50% higher prices than they had three years before.

⁵ Commercial processors in Uganda accept only maize that can be graded, with Grade 1 being the highest level. Factors that determine quality include percent moisture content, foreign matter, broken grain, and grain defects, including pest damage and aflatoxin levels. Most smallholder farmers' maize in Busoga region could not meet the lowest acceptable Grade 3 standard.

In other words, improving quality and transparency in grading dramatically increased farm gate prices across the board. In the Busoga region (Jinja catchment area), NBL has provided and incentivized access to a higher value market for farm households willing to make the effort in improved quality and productivity.

The rapid expansion of Nile Breweries, and their interest in local sourcing, created new market opportunities for AgroWays. They started selling grits on a small scale basis in 2001, but the expansion of the brewery and more aggressive local sourcing opened up a much larger opportunity for AgroWays. Another potential buyer for maize was the World Food Programme, which was also starting to seek local sources and first purchased maize from AgroWays in 2006. Both have very high food safety and grading standards. By certifying AgroWays as a Preferred Supplier with a long-term purchasing and pricing framework, NBL incentivized AgroWays to invest in improved cleaning, drying, storage and de-germing facilities, thereby allowing it to supply more product to NBL on a year-round basis. It has also motivated AgroWays to think much more aggressively about investing backwards in its supply chain to improve the quality and reliability at the source.

Now, about 70% of AgroWays' annual sales, approximately \$5.7 million or 1,000 MT per month, go to Nile Breweries. Relative to the price of maize of UGX 855-930, they sell maize grits⁶ to NBL for about UGX 1,500 and the germ/bran (mostly for animal feed) for about UGX 450, or a total value added of up to 114% (2 kg of maize produces 1 kg of grits and 1 kg of germ and bran).

UVAMA and the strengthening of the maize system has also opened market opportunities for other firms. For example, AgroWays has encouraged Nalweyo Seed Company (NASECO), a seed multiplier and supplier, to set up demonstration gardens in the Busoga region.

⁶ The de-germing process results in 50% grits and 50% germ and bran.

These are established with UVAMA lead farmers who then also become their sales agents, providing NASECO with a point of sale and creating greater farmer loyalty and output for both NASECO and AgroWays.

Supply Chain Infrastructure, Technology and Financing for Productivity and Efficiency Gains

MLI and UVAMA clearly demonstrate that supply chain infrastructure and technology provide the critical link between the key actors in the maize system. Value is created through greater efficiency, reducing post-harvest losses and the ability to manage for quality resulting in differentiated pricing. This value creation involved some of the following elements:

Construction of Village Aggregation Centers (VACs). This was financed by USAID with the management and technical support of AgroWays. Three VACs, constructed by the UVAMA project, were operational at the end of 2015, supplementing the four VACs developed in partnership with AgroWays under MLI. The last three VACs are owned and operated by farmer associations, giving the farmers a direct stake in the system as well as the capacity to manage crops in their own communities. VACs have the equipment and facilities for proper shelling, temporary storage, protection from pests and preliminary sampling for grading purposes. During the first nine months of 2016, the Busoga VACs received 6,317 MT of maize with rejection rates of less than 0.5%. In comparison, in 2011, rejection rates for maize from the Busoga region at the GBF were 7.8%, not including the large number of farmers who were deterred from bringing their maize due to poor quality and the GBF's distance.

Business model for mechanized shellers. The UVAMA project has provided 47 mechanized maize shellers to young operators in strategic locations in the Busoga region, including AgroWays and UVAMA's VAC sites and 15 in Western Uganda. After farmer groups sign Sheller Equipment Use Agreements with Agroways, ownership is transferred to the farmer groups directly. This allows AgroWays to supervise use of the shellers and to oversee maintenance. Through the agreement, AgroWays also manages the profits farmer groups generate through shelling. Fees collected for shelling are used to pay for maintenance, operations and labor, as well as purchasing additional shellers. The shellers are available to individual farmers at a fee, ranging from UGX 1,500 to UGX 2,500 per bag, depending on the location. The equipment is intended to reduce the percentage of broken maize grains delivered to the VACs and to provide income-generating opportunities for youth and farmer group members. A motorized sheller can shell 30 bags per hour with minimum grain breakage. Compare this to the traditional technique of using sticks to beat maize grains from the cobs, which often only shells two bags per hour at UGX 4,000 per bag, and both the increased productivity and savings becomes clear. **A survey of UVAMA farmers indicates that over 75% of the farmers are now using shellers, compared to only 12% before the program.**

Expansion and Improvement of Grain Bulking Facilities.

AgroWays has quadrupled its storage facilities from 5,000 MT to more than 20,000 MT at its GBFs in Jinja and Mbarara in Western Uganda. In addition to silos, the expansion included improved cleaning and drying equipment and two automated intake lines. Cleaning and drying capacity increased from 5 MT per day in 2009 to 100 MT per day currently.

De-germing equipment for greater value-added.

After installing this equipment, AgroWays was able to efficiently produce more maize grits for NBL, also upgrading the quality to "fine" grits. As noted earlier,, this creates significant value added for AgroWays and incentivizes them to invest backwards in the supply chain.



Improved seeds. AgroWays and NASECO, a large seed multiplier and distributor in Uganda, agreed to work together to organize maize demonstration plots in the Busoga region every planting season to promote various seed varieties. Improved seed varieties include drought and Striga weed resistant maize. These demonstrate how different maize varieties perform in combination with other inputs such as fertilizers and crop protection, which helps farmers decide whether or not to invest in inputs. NASECO also makes maize seed varieties available for purchase at the demonstration sites at affordable prices. About 70% of the farmers are now using improved maize seeds.

Warehouse receipts to facilitate farmer credit. Farmers need financing in order to utilize productivity-enhancing inputs. Farmers have been encouraged to take advantage of AgroWays' warehouse receipts by organizing into larger associations so they are able to aggregate their maize surplus and meet the 5 MT minimum requirement. Under the warehouse receipts, maize is stored at a fee for longer periods of time without compromising the grain's quality. In return, farmers use the warehouse receipts to access credit from financing institutions. While the Uganda Commodity Exchange that backed the original receipts has collapsed, AgroWays still provides farmers with a letter of comfort that they can use with the banks.

Facilitating access to inputs and finance. In 2016, 45% of UVAMA farmers had savings accounts (56% of them females) compared to 26% before the program. While only 8% of UVAMA farmers took out a loan for the 2016 season, these were mostly used for agricultural purposes, whereas before the program they were mostly used for school fees. One facilitating initiative involved an innovative new Alliance partner, Mobipay Limited, which has so far profiled 5,000 UVAMA-supported farmers in order to help them access crop insurance and other financial products at affordable rates. Mobipay has been working in Uganda for three years and assists financial and insurance institutions to access geographic information system (GIS) data of farmer fields and profiles. Mapped

data includes information on farm locations, size of land planted with crops, potential market value, production history and spending habits. Mobipay provides this information to financial institutions, crop insurance companies, input dealers and prospective buyers for a fee. For sustainability, Mobipay's mappers/village extension agents, who are farmers themselves, receive a commission for the mapping work.

Skill Building and Know How Transfer

Value and capacity in the maize system has also been created through various approaches to skill building and know-how transfer. The following are organized by Palladium as the project manager but structured to be sustainable beyond the end of the USAID funding:

Embedded services. Particular emphasis has gone to developing the capacity and business model for AgroWays to deliver services that it offers farmers and farmer groups in Busoga and in the districts of Ibanda and Kamwenge in Western Uganda. Farmer groups operating the newly established VACs are directly supported through management agreements and preferred maize sale-purchase agreements. AgroWays also supports maize demonstration plots at the three new VACs which serve as practical learning centers for nearby farmers to observe Good Agricultural Practices (GAP) and proper post-harvest handling (PHH) techniques. AgroWays believes its investment in embedded services will build supplier loyalty as well as higher productivity and better quality. The producer information collected by the Mobipay system has the potential of helping AgroWays to forecast likely harvests and thus facilitate its procurement planning and sales with NBL. AgroWays, in collaboration with the United Nations Capital Development Fund (UNCDF), is investigating the feasibility of using various digital financing solutions to pay and assist the farmers in its network. The logic of embedded services may seem obvious, but most traditional traders in Africa and elsewhere in the developing world worry that farmers will happily use the services

but end up selling to other traders. Although most UVAMA farmers still sell to other buyers, AgroWays is confident it will continue to build trust and relationships with farmers.

Farming as a business through lead farmers. UVAMA delivers training and ongoing extension services through lead farmers who are identified and recommended by their farmer groups, in part due to their willingness to try new practices. Lead farmers use their own plots to demonstrate the economic return from higher yields which can be achieved by investing in improved seeds, agronomic practices, fertilizers and other inputs. About 900 lead farmers (45% female) have been trained by the project in Busoga and Western Uganda. With these, and with the supervision of the UVAMA agriculture field officers (AFOs), the project has reached about 27,000 farmers (52% female) in over 23,000 households. Median yields have increased 65% over roughly three years. At 1,659 kg per hectare per season (for two seasons per year) these are trending in the right direction with significant room for further improvement. 100% of program participants have adopted at least one of the technologies demonstrated through UVAMA with the uptake of illustrative farm technologies shown below:

Uptake of Selected Farming Practices⁷ (%)

PERCENT OF UVAMA FARMERS	BASELINE	SEP 2015	OCT 2016
PROPER SPACING	22	82	95
1-2 SEEDS/HOLE	19	77	93
IMPROVED SEEDS	7	51	70
FERTILIZER	6	22	36
ANIMAL, MECHANIZED PLOWING	36	63	67

Post-Harvest Handling (PHH) practices. Lead farmers are also trained in proper post-harvest handling. This includes demonstration of the value of hand shellers, tarpaulins for on-farm drying, and use of the VAC services. The last day of the “Maize Post-Harvest Handling

and Storage” training is held at AgroWays’ GBF where the AgroWays’ Quality Controller provides an orientation on the importance of proper cleaning and drying, maize grading and standards and the company’s warehouse receipts services. Participants are given a simple handbook and a tarpaulin, among other items, intended to incentivize participation and use of the improved practices. Below is a figure that shows the uptake of selected post-harvest practices.

POST-HARVEST PRACTICES	BASELINE	SEP 2015	OCT 2016
USE OF TARPAULINS FOR DRYING	11	56	86
SHELLING	12	45	77
CLEANING	48	85	96

Farmer association strengthening. In April 2016, UVAMA contracted African Trainers & Entrepreneurs Forum (ATEFO-Uganda) to carry out trainings on group dynamics, financial literacy, and forming Area Cooperative Enterprises (ACEs). Four of these ACEs have been registered with district authorities and the Ministry of Trade, Industry and Cooperatives. The four ACEs have also registered as depositors with AgroWays.

Food safety training at AgroWays and Maganjo Grain Millers.

UVAMA provided a Food Scientist to train the staff of both these companies in managing food safety from farm to consumer. The Food Scientist also helped Maganjo to develop nutritious and affordable food products using maize germ and bran as ingredients. One of the products, Nutri-Xtra, is a highly nutritious maize porridge with maize bran and maize germ added, which can be consumed by infants, children and adults. It has more protein, essential oils (fat), and dietary fiber than other competing products on the market. Maganjo will start buying maize germ and bran in fall of 2016.

⁷ Based on surveys conducted by Palladium involving the same farmers in the two years

Measuring the Economic and Social Value Created

Projects supported by donors such as USAID or corporate social responsibility initiatives tend to measure impact at the beneficiary level, in this case, the farmers. While this perspective is extremely important, it fails to consider farmers as partners in a long term business alliance with the other key actors in the system. In order for changes in the system to be enduring and further scaled, all key actors must see enough value to invest their own resources (or raise third party capital) without further subsidy. Both the MLI and UVAMA projects were structured to generate more conventional results and the collection of impact data focused on the farmers. This case study offers an attempt at measuring overall value creation based on interviews with the actors and the reports produced by the projects.

Economic Value

The **economic value** created in the Uganda maize system can be summarized as:

Productivity gains + efficiency in Post-Harvest Handling + additional value from quality and new products.

The build-up of this value through the different actors in the system can be seen in the table below. At the farmer level, after only two years, the additional gross margin generated by maize sold by UVAMA farmers is an estimated \$1.7 million in the 2015-2016 season, or a 50% increase. This is likely to keep growing as more farmers adopt improved technologies, employ better farming practices, and continue sell more of their maize to high-end buyers like AgroWays, which

pay premium prices. Note that AgroWays is directly buying from an estimated 7,000 smallholder farmers through the VACs, while UVAMA has assisted about 27,000 farmers in their catchment areas, leaving significant room for growth. For AgroWays, the economic value created is best represented by the growth in total sales, especially sales of higher value-added maize grits to NBL.

This value creation can be contrasted with a total investment of \$5.3 million in the UVAMA project, with \$2.68 million from USAID and \$2.6 million by private sector partners to date. This excludes investments made by farmers and farm associations, but includes project management by Palladium.

	INDICATOR	BASELINE	2015/16 RESULTS	INCREASE
FARMERS ⁸	Yields per hectare.(maize)	1.21 MT	1.63 MT ¹⁰	35% average; 65% median
	Price per MT (all buyers)	\$139	\$179	29% average; 52% median
	Gross margin per hectare	\$88	\$132	50%
	Household incomes/year (USD)	\$316	\$688	118%
	Percent income from maize	45%	51%	6%
	Total gross margin from maize (all UVAMA farmers, USD) ⁹	\$3,326,400	4,989,600	\$1,663,200
AGROWAYS ¹¹	Total sales (USD)	N/A	\$5,300,000	N/A
	Sales to NBL in MT (maize grits)	480 MT	12,000 MT; \$3,500,000	2400%

⁸ Data is from a survey of UVAMA farmers in September 2015 and from a follow-up survey in October 2016. Baseline is the 2013-2014 growing season.

⁹ 27,000 farmers with average 1.4 hectares.

¹⁰ These yields are for farmers that applied one or two GAPs. Those applying almost all have yields of more than 3.5MT per hectare.

¹¹ Baseline year is 2009.

Social Value

Here we will discuss the social value created through UVAMA, which was primarily at the farmer and farm community level. The principal measurable results have been improved incomes, better household nutrition, household resilience, and new sources of non-farm income.

Household incomes. Household incomes more than doubled among UVAMA farmers in just three years. The baseline income of \$316 before UVAMA represents \$0.87 per day, below the \$1 per day threshold established by the UN for extreme poverty. The 2016 survey showed household income of \$688, or \$1.95 per day, which is above the revised UN threshold for extreme poverty of \$1.90. Not all of the improvement can be attributed to the maize system; farm families have also started growing more peanuts and soybeans for commercial sale. The growing surplus from maize sales seems to have facilitated investment in additional cash crops.

Improved nutrition: Even though farmers are selling more of their maize, their nutrition is actually improving because their higher incomes appear to enable them to buy different types of more nutritious food. Ninety-four percent of UVAMA farmers indicated that, since working with the project, their households have begun eating more types of foods more frequently. Most of these households reported being able to purchase higher quality posho (maize meal) and a wider variety of green vegetables, nuts, and fruits; many households added meats, fish and eggs several times a week.

Household resilience: One of the major problems for rural households in extreme poverty is that they are extremely vulnerable to risks such as drought and unpredictable rains, price fluctuations, pests and family emergencies. While hard to measure quantitatively, UVAMA families have a greater ability to mitigate the impact of these shocks through the following: better seeds selected for resistance to drought; improved storage; increased access to crop insurance and

financing through MobiPay assistance, and; households savings. **The number of households with savings accounts has increased from 25% to 52%, with the average savings up 19%.** We anticipate this will continue to improve as AgroWays starts utilizing other digital financing mechanisms such as direct mobile payments into farmer accounts.

Women and youth empowerment: Women represented 52% of participants in UVAMA trainings, 45% of the lead farmers and 56% of those with savings accounts. While women have always played a major role in Ugandan farms, the UVAMA program has put them in greater control of household economic assets and decision making. The inclusion of 37% of youth in the program is also significant since so many youth in rural areas see no future in farming and migrate to the cities.

Non-farm sources of income: The maize value chain is now creating additional jobs and sources of income. These opportunities include jobs at the VACs and GBFs, positions as operators of mechanized shellers and agents supporting Mobipay and Grameen on a short-term basis. So far, 189 youths have gained employment through these new roles.



Summary Conclusions and Lessons Learned

Addressing the Missing Middle: the Strategic Imperative in Sustainable Supply Chains

At the outset of this case, the NBL sourcing system was completely disconnected from the traditional local maize system. The lack of a commercially-oriented aggregator, which effectively organizes production and post-harvest logistics, has been a major constraint to implementing sustainable supply chains involving smallholders for many food companies. They often look to farmer cooperatives and associations to fill this role, and to non-government organisations to develop the co-ops.

In this case, AgroWays, a for-profit trading company, has provided the critical “bridge” by investing in backward linkages to producers and forward linkages to buyers such as NBL. As they aggregate more farmers and volume, they also create a market for other input and service providers, and opportunities for entrepreneurs operating equipment like mechanized shellers. Farmer associations were also able to develop around real value-added services like VACs.

In this case, with USAID’s funding, Palladium took on the difficult task of finding the “bridge” (AgroWays) and incubating a proof of concept. NBL played a relatively passive, albeit critical role, by providing a guaranteed offtake. However, this story could have just as easily been told from the perspective of SAB Miller directly investing with their local subsidiary Nile Breweries to catalyze this same change in the system. In addition to the offtake agreement, a modest investment in a program to strengthen the farmers in their catchment region (through AgroWays) would generate a return on the investment in the form of

an efficient local supply chain competitively substituting for imports. At the same time, this contributes to a larger customer base (more people with disposable income) as well as the economic and social development of the local economy.

The implication is that sustainable supply chains can be seen as a strategic and competitive opportunity by food and beverage companies. But success in execution will require finding and partnering with the AgroWays of the world to bring about change through the system.

Innovate for Impact

Determining the right business model for connecting the different actors in the system in ways that create value for all of them is key. In this case, Palladium was able to win funding from USAID through the Market Linkages Initiative project to further develop and test what, at the time, seemed to be a very unusual approach to supporting the poorest farmers: partnering with trading companies who were often perceived as the unscrupulous middlemen. Challenge grants provided by USAID convinced firms throughout East Africa to try new and innovative approaches for working with farmers, thus opening access to better markets. One of these early pilots was with AgroWays, and positive measurable results encouraged them to lead the subsequent Alliance (UVAMA).

Build Coalitions for Systemic Impact

Rather than just one actor showing up and trying to better itself and local communities, the case required active engagement by local players and institutions (lead farmers, local supply chain managers and entrepreneurs). Here, various actors dynamically participated together to work out and test innovative solutions, rather than treating

farmers as only “beneficiaries”. This takes us further on the road from “shared value FOR the people,” to “shared value OF the people, BY the people, and FOR the people”.

In this case, a change in relationships—between Nile Breweries and AgroWays through the preferred supplier agreement, between AgroWays and communities through investment in VACs, GBFs and embedded services, and within communities through the formation of farmer organizations—has catalyzed change throughout the system. The role of AgroWays and its willingness to fill the “missing middle” in the local supply chain system has been absolutely critical. Thus far, the process of building farmer loyalty in response to the AgroWays investment has been modest, as reflected in the share of farmer maize output it is capturing. However, the owner remains confident that their share will continue to grow as farmers continue to realize that the company is making a long-term commitment. For NBL, good, progressive supply chain managers are critical for implementing sustainable supply chain solutions.

The most striking behavior change has been among the farmers and farm associations. The rapid uptake of new technologies and practices in response to the opportunity for improved market access has been remarkable. Farmers are also coalescing in associations around the VACs and lead farmers, with women often assuming leadership roles. But a key feature is that all these relationships are commercially based and driven by perceived value. Equally important is that farmers retain control over when, how much, and to whom they sell.

The growing attention from commercial input suppliers and financial institutions is also interesting. These have generally ignored small-scale agriculture, given their extreme poverty, fragmentation (e.g. transaction cost per customer) and inability to pay. The UVAMA case shows that this bottom of the pyramid market can be accessed on a commercial basis once the farmers: 1) start aggregating their activities around an association and/or aggregation center, 2) have

a committed and reliable offtaker, and 3) have access to technical extension services to ensure that the inputs and financing result in the productivity gains needed to pay. What these input and financial companies need most are innovative distribution models designed for this type of market.

USAID played the role of catalytic seed funder, and Palladium was the orchestrator helping the companies to structure, test, and operationalize this “last mile solution”. The donor funding de-risks trying innovative solutions. Palladium has become an honest broker in an environment where generations of mistrust between farm communities, middlemen, and outside companies was common.

Governance, Measurement and Information

One of the major challenges for multi-actor systems and coalitions is how the governance of the system will function. This becomes increasingly relevant once the facilitator, Palladium, external funder, USAID, are no longer in the picture. The question is whether there are mechanisms in place that provide a governance and communications structure. The first level for this governance is provided by relationship agreements, related meetings, and ongoing communications. For example:

- The preferred supplier agreement between NBL and AgroWays provides clear mechanisms for ongoing procurement. This includes procedures for adjusting prices. Additionally, NBL meets quarterly with AgroWays and provides a procurement plan every 6 months.
- There are partnership agreements between AgroWays and the VACs with the farm associations that own/operate them, which will be supported by extension agents from UVAMA retained by AgroWays.

- Agreements between AgroWays and 62 sheller operators promote and expand the use of mechanical shellers.
- There is a new agreement to use MobiPay as a mechanism to provide data on farmer production and sales forecasts.
- New digital financing possibilities to meet farmers' needs (e.g. safe payment for their produce) have emerged to fill the existing market constraints.
- AgroWays organizes stakeholder workshops at the GBF in Jinja to introduce project activities to the government district officials and other stakeholders as well as to demonstrate AgroWays' GBF operations.

A second key element involves information that supports decisions by each of the actors in the system. For AgroWays, this especially means the ability to forecast likely production and sales by farmers and farm groups. Management is currently analysing the best way to integrate elements of the Mobipay system, including electronic payments for farmers. Farmers benefit from better market information as well as evidence on the financial benefits of new arrangements (see testimonial below).

Mobipay has emerged as one of the very interesting (and unexpected) players that can provide an important information-sharing role within the system. Its approach to profiling farmers and bundling this information on a fee basis for input suppliers, financial institutions and buyers is very promising. One question is whether they can also produce information of value to the farmers as part of their service offering.

Executing at Scale: What Remains To Be Done

This case demonstrates a model for commercially enduring sustainable supply chains. While the case provides a “proof of concept,” more remains to be done in order to ensure it is a success.

NBL has been a relatively passive actor so far. While it has incentivized AgroWays as a preferred supplier, and has clearly recognized the company's success by expanding its procurement to include sorghum and cassava pellets, it has not played an active role in implementing or building on the program. A key question is whether with the information provided by the case, NBL and its parent will see a strong enough business case to proactively expand it to other commodities and countries.

While UVAMA maize farmers have seen dramatic improvements in incomes, they remain poor and vulnerable, especially to weather and climate change. Additional technology enhancements are possible. For example, drip irrigation and more mechanization can help farms increase productivity by a factor of three to four times while reducing risks and expanding the land that a family can farm.

Just as this case has focused on a model for sustainable smallholder supply chains, input companies need new distribution and service models, linked to financing and offtakers, to provide these technical solutions to small-scale farmers. The UVAMA case provides hints of what is possible, but much remains to be done to fully integrate them into the system.



Testimonial from a Farmer

“When I say I am grateful to The Uganda Value-Added Maize Alliance (UVAMA), it’s not just a matter of formality, it’s gratitude that comes from the bottom of my heart. This is because before I became a beneficiary, my family was experiencing abject poverty. In fact, I couldn’t afford to buy shoes for my children. I only bought shoes for my first born after she was chased from school, but things are different now. All my children own pairs of shoes. We are now a happy family that can afford a variety of food. Meat and chicken were unheard of in my home but lately, at least, we can afford to eat them.

All these changes came into my life after I attended workshops organized by the program. I learned how to use improved seeds and fertilizers. We were also taught the value of recording keeping. This helped me to develop a savings culture. Before, I would use the fact that I earned very little as an excuse for not saving but through the trainings I learned that it’s only through savings that my finances would grow. By the time I joined, I owned a pig which I valued a lot but I was advised by the field officer to sell it so that I could afford fertilizers for my garden. Honestly I had reservations about the idea but I decided to go ahead and give it a try. Since then I have not looked back.

My investment paid off. I have managed to build a house for my family and I can afford school fees for my children and all the scholastic materials they need. I am no longer that mother who was

always in bad books with the teachers because I couldn’t afford requirements. I think this has also increased the interest of my children in school because they no longer feel left out.

Luckily for me, six months after joining the project, I also acquired a maize sheller. The machine is used to separate maize from cobs. I got the machine on a loan and it has really improved my life because there are many farmers in the area who need this service. During a good season, I make Sh 1.5 million. I use Sh 300,000 to pay instalments for my loan then I am able to finance preparations for my maize garden like buying fertilizers.

We were also connected to Grameen Foundation and acquired mobile phones which have really been helpful. People used to sell fake seeds but now, using my phone, I am able to locate good seeds. The phone is also a source of side income; we are paid for collecting data from fellow farmers. The money you make depends on how active you are. On average, I earn Sh 100,000 from collecting this data. I also acquired solar electricity so I don’t have to worry about buying paraffin any more.

Through the three years in this project, I have learned that once I incorporate hard work with everything I have learned, I can create a better environment and life for my children. So, the first thing I am going to do is purchase another sheller since I am almost done with this payment.”



Palladium is a global leader in the design, development and delivery of Positive Impact, the intentional creation of enduring social and economic value. We work with corporations, governments, foundations, investors, communities and civil society to formulate strategies and implement solutions that generate lasting social, environmental and financial benefits.

For the past 50 years, we have been making Positive Impact possible. With a team of more than 2,500 employees operating in 90 plus countries and a global network of over 35,000 technical experts, Palladium has improved—and is committed to continuing to improve—businesses, economies, societies and most importantly people's lives.