

**Feed the Future Innovation Lab for
Collaborative Research on Grain Legumes
(Legume Innovation Lab)**

**FY 2017 Annual Project Technical Progress Report
(October 1, 2016 – September 29, 2017)**

Project Code and Title: SO2.2: Enhancing Pulse Value-Chain Performance through Improved Understanding of Consumer Behavior and Decision-Making

Lead U.S. Principal Investigator and University: Vincent Amanor-Boadu, Kansas State University

Collaborating Host Country and U.S. PIs and Institutions:

1. Gelson Tembo, University of Zambia
2. Lawrence Mapemba, Lilongwe University of Agriculture and Natural Resources, Malawi
3. Fredy Kilima, Sokoine University of Agriculture, Tanzania
4. Allen Featherstone, Kansas State University
5. Kara Ross, Kansas State University

I. Abstract of Research and Capacity Strengthening Achievements

During FY2016-2017, national conferences on Beans for Health and Wealth were held in Malawi and Zambia with over 300 participants at each of the national conferences. These conferences allowed us to share their key research findings with industry stakeholders. Six workshops on improving inter-organizational relationship capacities and the bean industry's overall income were held across Malawi and Zambia. These workshops were well attended with each workshop having 50 or more participants. In the past year, we have developed an innovative approach to assessing the relative positions of food groups in food hierarchies. We have also identified preferred bean products in Malawi, Zambia, and Tanzania. This information is of interest to bean supply chain members, particularly bean breeders, and can be used to enhance overall chain performance. Knowledge of the food hierarchies combined with the bean product preferences allows us to provide bean supply chain participants with valuable information to improve overall chain performance and improve production and marketing decisions to create wealth along the chain and reduce poverty. To date, 29 students have been recruited for this project and 19 have completed their degree training from partner institutions and at Kansas State University.

II. Project Problem Statement and Justification

Grain legumes are not traditional staples in Zambia, Malawi, and Tanzania. They are not the priority crops for policymakers or breeders, traders or regulators. However, grain legumes present significant opportunities for many farmers and traders who produce and

sell them. Developing an improved understanding of how consumers make their decisions and an appreciation of the factors supporting these decisions could provide insights into how policymakers and the grain legume trade develop policies and strategies to enhance the contribution of grain legumes to overall economic progress. Given the health and nutritional benefits of grain legumes, identifying strategies that improve their consumption could contribute to improving overall health of individuals in these countries and potentially reduce their health budgets. These results may be scaled into other countries with similar population profiles.

The primary problem this project sought to address was developing an innovative approach to understanding factors that influence and shape consumers' food choices in three Feed the Future focus countries (Zambia, Malawi, and Tanzania). We also intended to identify the bean varieties of choice in these countries to inform bean breeders, helping them enhance the performance of the whole supply chain and not just producers.

The project was organized into three integrated dimensions:

- (i) Develop an empirical foundation for understanding the position of legumes in the food hierarchy and the factors that could improve this position;
- (ii) Identify opportunities for enhancing the position of legumes in the food hierarchy in each country; and
- (iii) Work directly with the legume trade and its supporters to develop individual and collective processes to take advantage of the knowledge emanating from the research to enhance their individual and collective economic performance.

The three focus countries represent the changes occurring in eastern and southern Africa—increasing urbanization; economic growth and increasing but unequally distributed incomes. This research will provide insights into how and where these changes are affecting legume consumption. They will provide insights into how these markets can overcome domestic consumption barriers to build stronger value chains to seize new markets.

III. Technical Research Progress

Objective 1: Identify and analyze the principal factors shaping legume consumption and their relative positions in consumers' food rankings in the selected countries.

Approaches and Methods

The project team collected primary data in three countries covering the project's scope and employed statistical and discrete choice experiment methods to complete objective one. We used the statistical methods to construct a food hierarchy for the six major food groups in the Malawi, Tanzania and Zambia. We used the discrete choice experiment to identify the relative importance of the different characteristics of beans in the selected countries. Our purpose is two-fold. Knowing legumes' rung on the food hierarchy will help in an assessment of the challenge associated with altering consumption habits to z

Results, Achievements and Outputs of Research:

Legumes' position in the food hierarchy in each of the three countries was determined in relation to five other food groups: roots and tubers; fish; meat and animal products; cereals; and fruits and vegetables. To establish positions, we used the per capita share of food budget allocated to each food group and the food group's criticality to the household's food and nutrition security. Our results show that legumes sat on the second rung from the bottom, ahead of roots and vegetables, in Malawi and Zambia, but on the fourth rung from bottom in Tanzania, ahead of roots and tubers, fruits and vegetables and meat and animal products. We surveyed about 680 people in Malawi, 740 in Tanzania and 841 in Zambia to conduct the primary analysis.

Knowing legume's position in the hierarchy is not enough; we also need to know how far it is from the other food groups. We described the percentage difference between legumes' rung score and that of the other food groups as distance measured in "degrees". This allowed us to estimate that cereals were 194° above legumes while fish was only 23° in Tanzania. Contrarily, roots and tubers were 63° below legumes while fruits and vegetables and meat and animal products were respectively 5° and 3° below legumes. In Zambia, cereals and meat and animal products were 101° and 129° respectively above legumes while roots and tubers were 35° below legumes. Fruits and vegetables and fish were respectively 34° and 71° above legumes. We determined that cereals were 206° above legumes in Malawi, followed by meat and animal products, fish and fruits and vegetables at 156°, 83° and 52° above respectively. We estimated roots and tubers to be 30° below legumes in Malawi. Across the three countries, there are very different pattern in the relative distance of the different food groups from legumes, which suggests the need for unique strategies to enhance legumes' position in the food hierarchy in each country. Estimated Kendall's Coefficient of Concordance for each of the countries confirms that there is no statistically significant concordance among the rankings of the food groups in any of the three countries. This further underscores the importance of pursuing different strategies to enhance legumes' position in the food hierarchy in each of the countries.

We identified color, grain size, cooking time and gravy quality as the critical attributes of interest to consumers through expert, trader, retailer and consumer interviews in the selected countries. Malawi consumers generally preferred fast-cooking medium-size red mottled beans with good quality gravy. In Tanzania, the typical preference across all product offerings was fast-cooking medium-size Njano bean with good gravy quality. A fast-cooking large-size purple bean (Kablengeti) with good gravy quality is the preferred bean product in Zambia. Across all three countries, consumers seemed to be more flexible with the color and size of their beans than they were with fast-cooking time and good quality gravy. Presenting consumers with a budget constraint accentuated their preferences for these non-negotiable product characteristics. Breeders would do well to focus on selecting for cooking time and gravy quality in order to build value innovation across the supply chain.

Expenditure is a product of quantity and price. Given that prices of the same product could differ because of the relative bargaining power of the participants in the exchange

at any time, we have chosen not to disaggregate expenditure. We hypothesized that legume expenditures will be determined by respondents' gender, age, household size, income in quintiles, education in categories (none, primary, secondary, technical/vocational and university/college), expenditure on other food groups and the types of food legumes were paired with. The statistically significant factors influencing the legume expenditures in the three countries are as follows¹:

- Household size was statistically significant in all three countries. In Tanzania, expenditure on legumes increase by TSH 3,261.39 for each additional household member. In Malawi, an additional household member increased expenditure on legumes by MWK 124.66. In Zambia, it was ZMK 2.23 for each additional household member. A percentage increase in household size increased legume expenditure by 0.23% in Zambia, 0.46% in Tanzania and 0.25% in Malawi.
- Being separated or divorced and widowed decreased expenditure on legumes in Malawi by about MWK 1,200. On the other hand, households headed by the widowed in Tanzania had TSH 8,848.24 less expenditure on legumes than households with unmarried or single individuals. Marital status had no effect on legume expenditure.
- While the third and fourth income quintiles in Malawi exhibited a statistically significant increase in legume expenditure over the first quintile, the second and the fifth were not statistically different. Income by quintiles had no effect on legume expenditures in Zambia.
- In Malawi, part-time employment, whether salaried or self-employed, was not statistically different from unemployed respondents even though the coefficients were positive. However, being full-time salaried or self-employed increased expenditure on legumes by MWK 955.94 and MWK 823.73 respectively. In both Tanzania and Zambia, employment type did not explain legume expenditures.
- Age had a small but positive effect on legume expenditure in Malawi, increasing by MWK 17.84 for each year in the age of the respondent. Contrarily, age was not significant in explaining legume expenditure in Tanzania and Zambia.
- A percentage increase in root crops expenditures increased legume expenditure by 0.18% in Zambia. In Tanzania, a percentage increase in cereal and root crops expenditures increase legume expenditures by 0.30% and 0.09% respectively. In Malawi, a percentage increase in fish and cereals expenditures increased legume expenditures by 0.10% and 0.13% respectively.
- Although accounting for only 17% of respondents in Malawi, households that paired beans with plantains or banana spent MWK 669.58 more on legumes than those who did not. No other food pairing presented a statistically significant coefficient. No paired food group presented a statistically significant relationship with legume expenditure in Tanzania and Zambia.

The foregoing suggests some strategic initiatives that may be used to improve legume expenditures, which as indicated may be consumers' willingness to pay higher prices, consume more, or do both. Policies and marketing efforts must focus on larger

¹ Statistical significant is determined at 5% or lower significant level.

households in all three countries and on households headed by older people in Malawi. The extent of complementarity in Tanzania between cereals and legumes is higher than in the other countries. This could be because legumes as an accompaniment to the staple maize has not been *discovered* in Zambia and Malawi. Recipe education initiatives on TV and other visual media could help address this challenge. In Malawi, it is important that alternative starches, such as plantains and bananas, be incorporated in these recipes since the results suggest a positive pairing effect with legumes.

Objective 2: Conduct situation analyses for legume production and marketing/distribution systems with a view to identifying the nature and extent of the gaps in their value chains.

We used secondary data available from the World Bank and the Food and Agriculture Organization of the United Nations to conduct the production and marketing/distribution situation for beans in Malawi, Tanzania and Zambia. We employed trend analyses and econometric analyses as our analytical tools. The datasets used for Malawi and Tanzania were the World Bank's nationally-representative Living Standards Measurement Survey – Integrated Survey on Agriculture (LSMS-ISA) and the Food Security Research Project (FSRP) dataset for Zambia.

Results, Achievements and Outputs of Research:

Zambia's bean production is the lowest among the three countries and has remained virtually flat over the past decade. This is probably related to Zambia having the lowest per capita consumption of beans among the three countries, about a quarter to a third of what prevails in the region. Thus, consumption is the principal driver of production. On the other hand, bean production in both Malawi and Tanzania have been increasing since the turn of the century at an average annual rate of about 7.3% and 6.5% per annum. Although Malawi's production of 58,277 MT was only about 10.7% that of Tanzania's in 2000, it had increased to nearly 17% by 2014 with Malawi producing nearly 190,000 MT. This trend in Malawi has been supported by price increases in significant organization of farmers into horizontal alliances. For example, the Grain and Legume Association (GALA) has organized more than 200,000 farmers into associations and farmer cooperatives that are working on facilitating input procurement and product sales. Such development has not been pursued in Tanzania. These farmers have increased the land planted to beans from under 144,000 ha in 2000 to almost 330,000 ha by 2014, an increase of almost 130%. They have also benefited from yield improvement, but not as dramatic as harvested area, about 41% over the same period. The improvements in area and yield in Tanzania were comparatively smaller, 68.7% and 22.3% between 2000 and 2014.

Because of the low production in Zambia, we know a lot less about downstream activities in Zambia's bean industry compared to the Malawi and Tanzania. Contributing to addressing this gap, our work has shown that traders are not only important in the supply chain, but their business and demographic characteristics influence prices. Sichilima, Mapemba and Tembo (2016) showed that the market where traders operate in Zambia influenced the types of beans they sold and the prices they received. This is important

because it illuminates how these traders engage with farmers upstream in their supply chain and influences how much they can afford to pay in their bean procurement decisions. We found that although product handling and its effect on quality and price has not received a lot of attention in the bean industry in the region, damaged beans put about a 10% discount on bean in Zambia. Despite the lack of formal knowledge on this, we discovered traders and retailers sorting beans manually – separating damaged grain and dockage to improve quality presented to the consumer. In some cases, they sorted beans by color, one grain at a time, with the view of achieving a superior presentation. It is important to note that traders are one of the alternative channels available to farmers. The others include non-governmental organizations and government institutions, such as prisons and the military. There is a gap in our knowledge about how these other channels influence performance in the bean supply chain. We will continue our research after the end date of this program and will develop policy briefs to help develop public policy and private initiatives to enhance supply chain performance and improve the economic well-being of chain stakeholders.

Graduate students at Kansas State University, Lilongwe University of Agriculture and Natural Resources, and Sokoine Agricultural University are also continuing this research in bean production and consumption and using it to fulfill their thesis requirement. A number of undergraduate research papers are currently under review by host country PI and other senior researchers at the University of Zambia. A number of research studies have already been published and presented at professional meetings in the US and abroad and in project-sponsored conferences in Malawi and Zambia. Additionally, these theses and research papers emanating from the research project are currently being developed for peer-reviewed publications co-authored by senior project researchers and their students.

Objective 3: Implement formal and informal capacity building initiatives to address identified gaps and support value chain management capacity across the legume industry in the focus countries.

This project has maintained a close relationship with producers and their downstream partners in the countries in which we have operated. Because of the strength of local partnerships in Malawi, we were more successful in penetrating local industry and building closer ties for capacity development. For example, developing a closer relationship with the Grain and Legume Association (GALA) in Malawi was critical in facilitating direct access to producers and their customers. We would suggest that future projects work on identifying **willing and able partners** very early to enhance dissemination of information and capacity building. While we discovered that individuals were open to agreeing to work with us, we realized that because of the depth of work involved in organizing, engaging and driving for results, many of them who did not fully appreciate the mission were unable to make the necessary investment to achieve the results. Therefore, it is important that project not only seek organizations that are willing to collaborate, but identify individuals who are able to understand the mission and its potential effect on their constituents in order to make the commitment to engage. We

benefited from such a relationship with the leadership of GALA, in particular Mr. Kennedy Munyapala, GALA's Executive Director. Over the life of the project, we engaged more than 1,250 farmers and their downstream partners in capacity building and information sharing activities. About 40% of the participants were females. We did these engagements through hosting 16 workshops and two national conferences. The workshops took place in all three countries but the conferences were held only in Malawi and Zambia. Our graduate education strategy was to support local partners with the supervision of graduate students supported by the program. In total, we supported 29 graduate students in this project, 15 of whom are females. Nineteen students have completed their degree training while 10 students remain active in their program of study. The students' work and those of their mentors are also being organized into presentations at professional meetings and into peer review publications.

Results, Achievements and Outputs of Research:

- The “Beans for Health and Wealth” national conference was held March 14-15, 2017 in Lilongwe, Malawi and its objective was to inform participants about the Zambian bean market and its consumers.
- A similar national conference was held in Lusaka, Zambia on June 7-8, 2017.
- Over 300 participants attended the conference in Lilongwe. On the first day of the conference in Lusaka, over 300 participants attended and 250 attended on the second day in Lusaka. Conference participants included breeders and researchers, farmers and “aspiring farmers”, bean and other commodity traders, bean processors, seed and fertilizer suppliers, and government and non-government personnel.
- Topics discussed at the conference included consumer preferences for the different characteristics of beans in the three countries, breeding initiatives, and nutrition policies and programs promoting bean consumption in Zambia and in the southern African region.
- Three workshops in three locations/regions were conducted across Malawi and Zambia. The workshops' objective is to help industry stakeholders build in their inter-organizational relationship capacities, understand the importance of leveraging trust and relationships to enhance their performance, and improve industry's overall income. The locations in Malawi were Lilongwe, Blantyre, and Mzuzu and the Zambian locations were Lusaka, Kitwe and Livingstone. The Lilongwe workshop was held on March 17, 2017 and about 60 participants attended. The workshops in Blantyre (50 participants) and Mzuzu (60 participants) were held on March 20 and 22, 2017, respectively. The Lusaka workshop took place on June 9, 2017 and had about 75 participants encompassing the bean supply chain. The workshop in Kitwe and Livingstone will take place on June 12 and on June 14, 2017, respectively and approximately 50 participants attended in each of the locations.

- At the national conference in Zambia, conference participants on their own, i.e., without any prompting from organizers, initiated the formation of a stakeholder group they dubbed Legume Consumption Promotion Association of Zambia. About 60 participants signed up with an objective to move some of the lessons from the conference forward into value opportunities for industry stakeholders.

IV. Major Achievements

- Determined how far beans are from the center of plate. Private and public policymakers can use this information to develop the appropriate policies and strategies to move beans and other legumes to the center of plate to enhance their contribution to the health of their customers and populations and improve the incomes of the upstream bean and legume supply chain.
- Discovered that bean grain size, color, gravy quality and cooking time were important determinants of consumer preference. Our work now involves engaging breeders to help them appreciate what we are calling “Breeding for Supply Chain Performance,” an initiative that uses consumer preference information to develop varieties that increase the financial performance of all stakeholders at the different stages in the supply chain in different markets.
- Held the first national conference on beans (as a strategic crop for wealth and health) in both Malawi and Zambia. Local organizations in Malawi see this critical to their overall growth that they are planning to organize a sequel next year.
- Held six strategic alliance workshops across Malawi and Zambia.
- Trained 12 graduate students at the MS level and 3 students at the MAB level. Four out of the 12 MS students have completed their degree and 1 MAB student completed her degree.
- Contributed to enhancing the business and management capacity of more than 1,250 industry players.
- Completed more than 8 policy briefs, delivered 20 oral and poster presentations at academic conferences and industry training sessions. Currently working on translating presented research papers into peer-reviewed publications involving students and project principal investigators.
- Through close engagement with industry participants in Malawi and Zambia, we are continuing to provide support for industry initiatives that have emerged from our activities.
- Built strong industry relationships with project investigators in host countries.

V. Research Capacity Strengthening

The project worked with host country partners in the supervision of the theses for students. In doing this, we helped our host country partners to use alternative tools and mentorship mechanisms with their students. We also helped students appreciate the scientific approach. As noted by one student in Malawi, “I wish I had had the opportunity to work with this team throughout my education program.” We also included

host country students in organizing and preparing for the national conferences. Although they did not present any papers at the event themselves, they provided rapporteur support for the conferences and the workshops.

We did not purchase any equipment over \$5,000 for any our host country partners in support of research capacity strengthening.

VI. Human Resource and Institution Capacity Strengthening

1. Short-Term Training

Our main HR and institutional capacity strengthening in 2016/17 was on industry institutions. We built these into the national conferences and workshops we hosted in Malawi and Zambia. We have reported the results and achievements from these under the Results and Achievements section above.

We recognized that to organize a two-day national conference that covered both the public and private sectors would require significant local organization that the project was not structured to have. To over this, we sought permission and approval from the Management Office to award a contract to a local event management company to provide the requisite services. The contract was structured to cover a two-day conference and three full-day workshops in three different cities in Malawi and Zambia. Tanzania was not included in these programs due to instruction from the MO. However, our Tanzanian host-country PI was involved in all programming in the other two countries.

We negotiated a fixed cost contract with a local event management company in Malawi that had regional event staging experience, Ovation Advertising. The contract was for a total of \$141,945. This was distributed between the two countries as follows: Malawi - \$75,255; and Zambia - \$66,690. We had assumed that we will spend about \$100/person for all events – conferences and workshops in both countries. Based on our budget, we were expected about 1,420 participants in the events. Given that total number of participants (counting conference participants on both days as independent) was 1,535, we gained in our expenses, coming in at about \$92.47, about 7.5% below our budgeted cost per person. Thus, for the same amount of money, we were able to reach about 8.1% more people.

	Short Training 1	Short Training 2
Purpose of Training	To help bean industry stakeholders' strategic alliances to enhance their performance and improve bean industry's overall income	To help bean industry stakeholders' strategic alliances to enhance their performance and improve bean industry's overall income
Type of Training	Workshop	Workshop
Country Benefitting	Malawi	Malawi
Estimated USAID funding for activity: US\$ for Instruction		
Estimated USAID funding for activity: US\$ for Participants		
Estimated USAID funding for activity: US\$ for Travel		
Location and Dates of Training	March 17, 2017 at Lilongwe	March 20, 2017 at Blantyre
Number receiving training (Male)	31	35
Number receiving training (Female)	29	15
Home institution(s) (if applicable)		
Institution providing training or mechanism	KSU, LUANAR, SOIKOINE, UNZA	KSU, LUANAR, SOIKOINE, UNZA

	Short Training 1	Short Training 2
Purpose of Training	To help bean industry stakeholders' strategic alliances to enhance their performance and improve bean industry's overall income	To help bean industry stakeholders' strategic alliances to enhance their performance and improve bean industry's overall income
Type of Training	Workshop	Workshop
Country Benefitting	Malawi	Zambia
Estimated USAID funding for activity: US\$ for Instruction		
Estimated USAID funding for activity: US\$ for Participants		
Estimated USAID funding for activity: US\$ for Travel		
Location and Dates of Training	March 22, 2017 at Mzuzu, MW	June 9, 2017 at Lusaka, ZM
Number receiving training (Male)	42	50
Number receiving training (Female)	18	25
Home institution(s) (if applicable)		
Institution providing training or mechanism	KSU, LUANAR, SOIKOINE, UNZA	KSU, LUANAR, SOIKOINE, UNZA

	Short Training 1	Short Training 2
Purpose of Training	To help bean industry stakeholders' strategic alliances to enhance their performance and improve bean industry's overall income	To help bean industry stakeholders' strategic alliances to enhance their performance and improve bean industry's overall income
Type of Training	Workshop	Workshop
Country Benefitting	Zambia	Zambia
Estimated USAID funding for activity: US\$ for Instruction		
Estimated USAID funding for activity: US\$ for Participants		
Estimated USAID funding for activity: US\$ for Travel		
Location and Dates of Training	June 12, 2017 at Kitwe, ZM	June 14, 2017 at Livingstone, ZM
Number receiving training (Male)	35	40
Number receiving training (Female)	15	10
Home institution(s) (if applicable)		
Institution providing training or mechanism	KSU, LUANAR, SOIKOINE, UNZA	KSU, LUANAR, UNZA

2. Degree Training in the US or elsewhere

	Student 1	Student 2
Name	Moses Chitete	Dorothy Chisusu
Country of Citizenship	Malawian	Malawian
Gender	Male	Female
HC Institution to Benefit from Training	LUANAR	LUANAR
Training Institution	LUANAR, Malawi	LUANAR, Malawi
Supervising LIL PI	Dr L. Mapemba	Dr L. Mapemba
Degree Program for training	Master of Science	Master of Science
Field or Discipline	Agricultural and Applied Economics	Agricultural and Applied Economics
Thesis Title/Research Area	Market Structure, Conduct and Performance of Beans Marketing System in Malawi	Contribution of common beans to household dietary diversity and calorie consumption in Malawi
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction		
Estimated USAID funding for activity if not conducted in US: US\$ for Participants		
Estimated USAID funding for activity if not conducted in US: US\$ for Travel		
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction		
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants		
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel		
Start Date (month/year)		
Projected Completion Date (month/year)	2017	2017
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A	N/A
Training status	Completed	Completed

	Student 1	Student 2
Name	Yanjanani Lifeyo	Edwin Kenamu
Citizenship	Malawian	Malawian
Gender	Male	Male
HC Institution to Benefit from Training	LUANAR	LUANAR
Training Institution	LUANAR, Malawi	LUANAR, Malawi
Supervising LIL PI	Dr L. Mapemba	Dr L. Mapemba
Degree Program for training	Master of Science	Master of Science
Field or Discipline	Agricultural and Applied Economics	Agricultural and Applied Economics
Thesis Title/Research Area	Market participation of smallholder common bean farmers in Malawi: A Triple Hurdle Approach	Consumers' willingness to pay for bean attributes in Malawi
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction		
Estimated USAID funding for activity if not conducted in US: US\$ for Participants		
Estimated USAID funding for activity if not conducted in US: US\$ for Travel		
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction		
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants		
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel		
Start Date (month/year)		
Projected Completion Date (month/year)	2017	2017
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A	N/A
Training status	Completed	Completed

	Student 1	Student 2
Name	Ocran Chengula	Ezekiel Swema
Citizenship	Tanzania	Tanzania
Gender	Male	Male
HC Institution to Benefit from Training	Sokoine University of Agriculture	Sokoine University of Agriculture
Training Institution	Sokoine University of Agriculture	Sokoine University of Agriculture
Supervising LILPI	Fredy T. M. Kilima	Fredy T. M. Kilima
Degree Program for training	M.Sc.	M.Sc.
Field or Discipline	Agric. Econ.	Agric. Econ.
Thesis Title/Research Area	Factors underlying commercialization of bean production among smallholder bean farmers in Tanzania	Common Beans Attributes and Consumer Preference in Dar Es Salaam, Tanzania
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction		
Estimated USAID funding for activity if not conducted in US: US\$ for Participants		
Estimated USAID funding for activity if not conducted in US: US\$ for Travel		
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction		
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants		
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel		
Start Date (month/year)		
Projected Completion Date (month/year)	2017	2018
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A	N/A
Training status	Active	Active

	Student 1	Student 2
First and Other Names	Elizabeth Medard	Rameck Rwakalaza
Citizenship	Tanzania	Tanzania
Gender	Female	Female
Training Institution	Sokoine University of Agriculture	Sokoine University of Agriculture
HC Institution to Benefit from Training	Sokoine University of Agriculture	Sokoine University of Agriculture
Supervising LIL PI	Fredy T. M. Kilima	Fredy T. M. Kilima
Degree Program for training	M.Sc.	M.Sc.
Field or Discipline	Agric. Econ.	Agric. Econ.
Thesis Title/Research Area	Factors Underlying Beans' Consumption Decisions in Dar Es Salaam Tanzania	Quadratic Almost Ideal Demand System For Common Beans Demand in Dar Es Salaam, Tanzania
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction		
Estimated USAID funding for activity if not conducted in US: US\$ for Participants		
Estimated USAID funding for activity if not conducted in US: US\$ for Travel		
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction		
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants		
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel		
Start Date (month/year)		
Projected Completion Date (month/year)	2018	2018
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A	N/A
Training status	Active	Active

	Student 1	Student 2
Name	Jackson Jaccob	Mabvuto Zulu
Citizenship	Tanzania	Zambian
Gender	Male	Male
HC Institution to Benefit from Training	Sokoine University of Agriculture	The University of Zambia
Training Institution	Sokoine University of Agriculture	The University of Zambia
Supervising LIL PI	Fredy T. M. Kilima	Gelson Tembo
Degree Program for training	M.Sc.	Master of Science
Field or Discipline	Agric. Econ.	Agricultural Economics
Thesis Title/Research Area	Drivers of Beans' Consumers Choice in Tanzania	Consumer Preferences For Common Beans In Lusaka, Zambia. A Stated Preference Approach
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction		0
Estimated USAID funding for activity if not conducted in US: US\$ for Participants		0
Estimated USAID funding for activity if not conducted in US: US\$ for Travel		0
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction		0
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants		0
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel		0
Start Date (month/year)		September 2015
Projected Completion Date (month/year)	2018	2018
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A	N/A
Training status	Active	Active

	Student 1	Student 2
Name	Isabel Sakala	Nandi Nomsa Jama
Citizenship	Zambian	Zambian
Gender	Female	Male
HC Institution to Benefit from Training	The University of Zambia	The University of Zambia
Training Institution	The University of Zambia	The University of Zambia
Supervising LIL PI	Gelson Tembo	Gelson Tembo
Degree Program for training	Master of Science	Master of Science
Field or Discipline	Agricultural Economics	Agricultural Economics
Thesis Title/Research Area	Consumer Choices and Consumption of Dry Common Beans in Zambia: A Double Hurdle Approach	A Quadratic Almost Ideal Demand System Estimation For Common Beans in Lusaka
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction	0	0
Estimated USAID funding for activity if not conducted in US: US\$ for Participants	0	0
Estimated USAID funding for activity if not conducted in US: US\$ for Travel	0	0
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction	0	0
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants	0	0
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel	0	0
Start Date (month/year)	June 2016	June 2016
Projected Completion Date (month/year)	February 2018	February 2018
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A	N/A
Training status	Active	Active

	Student 1	Student 2
Name	Ednah Kasanda	Austin Mbamba
Citizenship	Zambian	Malawian
Gender	Female	Male
HC Institution to Benefit from Training		
Training Institution	Kansas State University	Kansas State University
Supervising LIL PI	Vincent Amanor-Boadu	Vincent Amanor-Boadu
Degree Program for training	Master of Agribusiness	Master of Agribusiness
Field or Discipline	Agribusiness	Agribusiness
Thesis Title/Research Area	Gender and Decision Making in Agriculture: A Case Study of Groundnuts Farmers in Zambia	Factors influencing the intensification of bean consumption in Malawi
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction		
Estimated USAID funding for activity if not conducted in US: US\$ for Participants		
Estimated USAID funding for activity if not conducted in US: US\$ for Travel		
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction		
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants		
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel		
Start Date (month/year)	January 2015	Oct 2016
Projected Completion Date (month/year)	June 2017	May 2018
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A	N/A
Training status	Completed	Active

	Student 1
Name	Marvin Mbaso
Citizenship	Malawian
Gender	Male
HC Institution to Benefit from Training	
Training Institution	Kansas State University
Supervising LIL PI	Vincent Amanor-Boadu
Degree Program for training	Master of Agribusiness
Field or Discipline	Agribusiness
Thesis Title/Research Area	Socio-economic determinants of the position of beans in Malawian diets
Estimated USAID funding for activity if not conducted in US: US\$ for Instruction	
Estimated USAID funding for activity if not conducted in US: US\$ for Participants	
Estimated USAID funding for activity if not conducted in US: US\$ for Travel	
Estimated OTHER funding for activity if not conducted in US: US\$ for Instruction	
Estimated OTHER funding for activity if not conducted in US: US\$ for Participants	
Estimated OTHER funding for activity if not conducted in US: US\$ for Travel	
Start Date (month/year)	Jan 2016
Projected Completion Date (month/year)	May 2018
If enrolled at a US university, will Trainee be a "Participant Trainee" as defined by USAID?	N/A
Training status	Active

VII. Achievement of Gender Equity Goals

We have consciously endeavored on attaining gender equity in our activities. Five of our 15 graduate students supported by the program are females. Overall, 15 female graduate student and 14 male graduate students have been trained under this program.

Approximately 500 of the more than 1,250 participants in our industry engagement and capacity building programs are females. In total, 345 people attended the six strategic alliance workshops in Zambia and Malawi with 112 (32 percent) of them being women.

VIII. Implementation of Data Management Plan

Currently the datasets from the three consumer surveys are being formatted in a software independent platform and the three codebooks are being prepared. The datasets and the cookbooks are expected to be uploaded to USAID Development Data Library by December 2017.

IX. Scholarly Accomplishments

V. Amanor-Boadu and K. Ross. 2017. “On the Role of Food Hierarchies on Consumption Choices: The Case of Legumes.” *In progress. Target journal: Food Policy.*

V. Amanor-Boadu and R. Armah. 2017. “A System Dynamics Approach to Legume Consumption and Production in Select Markets: 2020-2035.” *In progress. Target journal: International Journal on Food System Dynamics.*

V. Amanor-Boadu. 2017. Framing the Vision: Beans for Health and Wealth. National Conference Beans for Health and Wealth. Lilongwe, Malawi and Lusaka, Zambia.

V. Amanor-Boadu. 2017. Sharpening the Vision: Beans for Health and Wealth. National Conference Beans for Health and Wealth. Lilongwe, Malawi and Lusaka, Zambia.

V. Amanor-Boadu and K. Ross. 2017. Exploiting Food Hierarchies in Enhancing the Legume Industry’s Competitiveness. National Conference Beans for Health and Wealth. Lilongwe, Malawi and Lusaka, Zambia.

R. Armah and V. Amanor-Boadu. 2017 Towards 2050: Projecting legume consumption and production under alternative socioeconomic and resource conditions. The Feed the Future Legume Innovation Lab, Grain Legume Research Conference. Ouagadougou, Burkina Faso, Aug. 12-18, 2017.

D. T. Banda, L. Mapemba, V. Amanor-Boadu, K. Ross and K. Machira. 2017. Effect of Interaction of Common Bean Attributes on Consumer Choice of Bean Varieties in

- Lilongwe District. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- D. T. Banda, K. Ross, V. Amanor-Boadu, and L. Mapemba. 2017. Effect of Interaction of Attributes that Influence Consumer Choice of Bean Varieties in Lilongwe City, Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.
- E. Chishimba, G. Tembo, V. Amanor-Boadu and M. Mwiinga. 2017. Factors Affecting Bean Profitability among Bean Traders in Zambia. Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.
- D. Chisusu. 2017. Contribution of Common Beans to Household Dietary Diversity and Calorie Consumption in Malawi. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- M. Chitete, H. Phiri, L. Mapemba, V. Amanor -Boadu, and J. Dzanja. 2017. Analysis of Structure, Conduct and Performance of Beans Marketing in Malawi: A Case Study of Lilongwe District. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- E. Kasanda. 2017. Gender and decision-making in agriculture: A case study of groundnuts farmers in Zambia. Master of Agribusiness Thesis. Kansas State University. Manhattan, Kansas. Available at <https://krex.k-state.edu/dspace/handle/2097/35785>.
- E. Kenamu, L. D. Mapemba, K. Ross and V. Amanor-Boadu. 2017. Household Common Beans Consumption Behaviour in Urban Malawi: Empirical Evidence from Lilongwe City. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- E. Kenamu, L. D. Mapemba, V. Amanor-Boadu and K. Ross. 2017. Joint Consumption of Multiple Common Bean Varieties in Lilongwe City, Malawi, Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.
- P. Kotchofa and K. Ross. 2016. "Factors influencing beans consumption in Sub-Saharan Africa: Case of the Urban Consumer in Zambia." Missouri Valley Economics Association Conference, St. Louis, MO.
- P. Kotchofa, K. Ross, V. Amanor-Boadu and Y. Zereyesus. Expenditure and Price Elasticities of Demand for Legumes in Northern Ghana, Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.

- Y. Lifeyo. 2017. Market Participation of Smallholder Common Bean Producers in Malawi. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- L. Mapemba, E. Kenamu and M. Mumba. 2017. Legume Value Chain Analysis of Demand and Supply in Malawi. Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- W. Msukwa. 2017. Household Demand for Common Beans in Lilongwe District of Malawi. Master of Science in Agricultural and Applied Economics Thesis, Lilongwe University of Agricultural and Natural Sources. Lilongwe, Malawi.
- W. Msukwa, J. Mangisoni and L. Mapemba. 2017. Household Demand for Common Beans in Lilongwe District of Malawi. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- N. Moyo. 2016. Situational Analysis of Common Bean Production, Marketing and Consumption in Malawi. Master of Science in Agribusiness Thesis, Lilongwe University of Agricultural and Natural Sources. Lilongwe, Malawi.
- N. Moyo, V. Amanor-Boadu, K. Ross, L. Mapemba and J. Dzanja. 2016. The Common Bean Subsector in Malawi: Current and Future Outlook of Yield, Area and Overall Production. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.
- N. Moyo, L. Mapemba, V. Amanor-Boadu and K. Ross. 2017. Production and Marketing Constraints, Current Status and Future Outlook of Common Bean Sub-Sector in Malawi, Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.
- M. Mwiinga. 2017. Factors affecting bean consumption among Lusaka residents. The Feed the Future Legume Innovation Lab, Grain Legume Research Conference. Ouagadougou, Burkina Faso. Aug. 13-18, 2017.
- E. Swema. 2017. Consumer Preference for Common Bean Attributes in Dar-Es-Salaam, Tanzania. Master of Science in Agricultural and Applied Economics Thesis, Sokoine University of Agriculture. Morogoro, Tanzania. *In progress*.
- E. Swema, G. Mlay, F. Kilima, V. Amanor-Boadu and K. Ross. Consumers' Preferences for Common Beans' Attributes in Dar es Salaam, Tanzania. Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.
- M. Tumeo, L. Mapemba, V. Amanor-Boadu, K. Ross and A.-K. Edriss. 2016. Consumer Choice of Dry Common Beans in Malawi: Case of Lilongwe City. Policy Brief, Lilongwe University of Agriculture and Natural Resources Lilongwe, Malawi.

M. Mazunda, L. Mapemba, V. Amanor-Boadu Vincent and K. Ross. 2017. Consumer Choice of Dry Common Beans in Lilongwe City of Malawi, Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.

W. Msukwa, L. Mapemba, V. Amanor-Boadu and K. Ross. 2017. Household Demand for Common Beans in Lilongwe District of Malawi: A Censored Regression Approach. Poster presented at the Legume Innovation Lab Global Conference, Ouagadougou, Burkina Faso, Aug. 13-18, 2017.

X. Achievement of Impact Pathway Action Plan

We have indicated in our impact pathway narrative that the project will focus on beans and cowpeas. It became apparent in our deliberations that cowpeas were not a major crop in the study area and that we would be better off focusing on beans. Therefore, we restricted our focus to beans. That clarification is the primary deviation from the original impact pathway presented.

Our research focused on identifying the position of beans in the food hierarchy in our host countries. This was important because it would indicate the potential hurdle that would have to be overcome in order to enhance bean consumption. In the initial reports, we found that beans were on lower rungs of the food hierarchy in all three countries. This was true regardless of consumer characteristics.

We developed reports on the bean industry situation in each country. The target of these reports was researchers interested in the bean and legume industry in our host countries and the southern Africa sub-region, policymakers and industry stakeholders. We have presented these reports in numerous venues and shared them with the target audience in the host countries. We also developed numerous policy briefs that have also been shared with the target audience. We also delivered several workshops and capacity building programs over the course of the project. We had indicated that we expected these reports to enhance performance of these target audiences by 30%. At this point, we are unable to confirm the impact. However, activity enhancements in Malawi and Zambia reported above would suggest that we might exceed this modest enhancement by 2025. For example, an industry group focused on enhancing consumption has been initiated in Zambia and a producer association in Malawi has developed a special relationship with some traders to improve their value chain operations.

We indicated developing innovative business models for the different nodes in the bean value chain. The chains were short in all three countries, thus, we focused on facilitating business models at the producer and trader interfaces. Bean processing is lacking in all three countries. One processor with high profile operations in Zambia went into receivership not long after we started working with them and a new processor was just coming on line in southern Zambia. We initiated conversations with this new processor

and helped the company's leadership appreciate the idiosyncrasies of the food industry given their non-food background. We envisage the possibility of some processors in the Malawi tobacco industry exploring potential opportunities in beans with the increasing exit pressure for tobacco industry stakeholders.

Our monitoring and evaluation of the business models we have contributed to developing will continue in the post-project era. We are doing this by maintaining our relationships with the stakeholders. We will collect performance information from producer associations, processors and traders over the next several years with the view to providing support and evaluating performance. The challenge we envisage is in changes in the personnel in these organizations and the potential loss of continuity given that we are hoping to sustain engagements over the next eight years.

Our outreach programs – conferences and workshops – have enhanced the public's awareness about beans for health and wealth in both Malawi and Zambia. We hope we can undertake a similar activity in Tanzania in the near future to accelerate consumption in that country since it has the highest potential to assume higher value product consumption because of the current position of beans in its food hierarchy. For example, in both Malawi and Zambia, our project organized the first national conference on beans. Local stakeholders have been impressed enough about its success they are planning to make these initiatives annual events for promoting bean consumption. The local stakeholder effort to undertake these events provides evidence that we have succeeded in creating an enabling environment to continue the achievements of this project.

ANNEXES

Annex 1. Tables, Figures, and Photos Cited in the Report

See the attached document for the scholarly accomplishments for FY2017.

Annex 2. Literature Cited

Sichilima, T., L. Mapemba, and G Tembo. (2016). Drivers of Dry Common Beans Trade in Lusaka, Zambia: A Trader's Perspective. Sustainable Agriculture Research.