

**Feed the Future Innovation Lab for Collaborative Research on Grain Legumes
PROJECT TECHNICAL DESCRIPTION**

COVER PAGE

Code and Title of Legume Innovation Lab Project: SO2.2 ENHANCING VALUE CHAIN PERFORMANCE THROUGH IMPROVED UNDERSTANDING OF CONSUMER BEHAVIOR AND DECISION-MAKING		
Name, institutional affiliation and contact information of Lead U.S. Principal Investigator and University: VINCENT Amanor-Boadu, KANSAS STATE UNIVERSITY, 306 WATERS HALL, DEPARTMENT OF AGRICULTURAL ECONOMICS, MANHATTAN, KS 66506 TEL.: 785-532-3520 EMAIL: VINCENT@KSU.EDU		
Name(s) and institutional affiliation of all Host Country (HC) and U.S. Co-PIs: Gelson Tembo, University of Zambia; Lawrence Mapemba, Lilongwe University of Agriculture and Natural Resources; Fredy Kilima, Sokoine University of Agriculture; Allen Featherstone, Kansas State University; Kara Ross, Kansas State University		
Project Period:	Total Funding for 4.5 year Project	Total non-federal cost share commitment by U.S. institution(s)
April 1, 2013 – September 29, 2017	\$1,090,125	\$100,000
HCs where project activities will be implemented:	HC institutions to be sub-contracted (abbreviated names):	Percent of total project funding budgeted for each HC institution to be subcontracted
MALAWI, TANZANIA & ZAMBIA	LILONGWE AG. UNIVERSITY, SOKOINE UNIVERSITY OF AGRICULTURE, & UNIVERSITY OF ZAMBIA	LUANR (22%); UNZA (23%); SUA (23%) Total allocation = 67%
Authorized Lead U.S. University Representative: Name: PAUL LOWE Title: VICE PRESIDENT, RESEARCH Mailing Address: 102 FAIRCHILD, KANSAS STATE UNIVERSITY, MANHATTAN, KS 66506 Email Address: PLOWE@KSU.EDU Phone Number: 785-532-2468 Signature:_____ Date:_____		

SUMMARY PAGE (must print on one page)

Code and Title of Legume Innovation Lab Project: SO2.2: Enhancing Pulse Value-Chain Performance through Improved Understanding of Consumer Behavior and Decision-Making	
Name and Institutional Affiliation of the U.S. Lead Principal Investigator: Vincent Amanor-Boadu, Kansas State University	
Abstract (Limit: 1800 characters including spaces—about 200-250 words): <p>Despite their high nutritional profile and knowledge about their nutritional benefits, grain legumes are not high on the food hierarchy in Malawi, Tanzania and Zambia. The challenge confronting producers and their supply chains is how to enhance their competitiveness in their local markets and get the necessary policy support from their government to sustain it. This project seeks to make two critical contributions to this challenge. First, it seeks to develop a clearer appreciation of the factors influencing grain legume consumption in the three countries to provide empirical direction for market and policy development. Second, it seek to provide training and capacity building support for the industry's stakeholders to seize identified opportunities and address existing and emerging challenges. When this project succeeds, it will contribute to creating value in the grain legume value chain.</p> <p>The project has three integrated dimensions: An empirical foundation for understanding factors and their influence on food choices; application of the empirical results in crafting policies and facilitating knowledge and skill development in managing value chains; and developing and delivering outreach programs to help both private and public stakeholders improve the performance of grain legume value chains. These activities contribute to supporting strategies and initiatives that enhance the wellbeing of smallholder producers. This project, therefore, provides innovative and unique pathways that bring smallholder producers and public and private stakeholders together to help achieve the underlying objectives of the Feed the Future initiative.</p>	
Summary Checklist (<i>select as many as appropriate</i>)	
<input type="checkbox"/>	Project involves the use of proprietary transgenes or the generation of genetically modified organisms (GMOs)
<input checked="" type="checkbox"/>	Project involves human subjects and requires approval
<input type="checkbox"/>	Project involves animal use and requires approval
<input type="checkbox"/>	Project involves the use of agricultural pesticides and requires a Pesticide Evaluation and Safe Use Action Plan
<input type="checkbox"/>	Project involves M.S. or Ph.D. degree training of HC personnel at a U.S. university (How many?) _____

I. Problem Statement and Justification

Grain legumes are the second most important crop in Sub-Saharan Africa and they play an important role in smallholder agricultural economics in Africa. For example, they contribute to household food security because of their relatively higher drought resistance compared to cereals and to household income when surpluses are sold. When planted before cereals or inter-planted with cereals and other crops, they enhance production by fixing nitrogen. Because of their multiple benefits, grain legumes are seen as *potential* instruments in reducing poverty, increasing income, improving health and nutrition and addressing food security among smallholder African farmers. However, grain legumes' *potentiality* in contributing to smallholder producers' wellbeing is limited by the availability of markets and accessibility to these markets by smallholder producers.

Research shows that integrating smallholder producers into effective local, regional and/or global value chains provided a sustainable income growth and less operational uncertainty (Zylberberg, 2013). However, there is a dearth of knowledge about the factors that shape demand for grain legumes in eastern and southern Africa. Addressing this knowledge gap would support entrepreneurs and others seeking to do business or improve their businesses in the industry and provide opportunities to facilitate the development of value chains that incorporate smallholders into these local, regional and/or global markets in ways that contribute to enhancing their incomes and reducing their exposure to poverty. Indeed, interventions that did not rely on cogent market information have been unsuccessful in achieving their desired outcomes to enhance incomes and reduce poverty. Hence, knowing demand drivers and their elasticities provide a pathway to help private business and public policymakers craft sustainable strategies that not only enhance value generation along the supply chain but engender an environment that supports the adoption of practices that produce the highest benefits for smallholders and society (Bridle and Bonney, 2010).

Average per capita consumption of maize in 2009 was in excess of 100 kg/year in Malawi and Zambia and 58.1 kg/year in Tanzania (FAO, 2009). Yet, the average per capita consumption of pulses in the same year is below 20 kg/year in Malawi and Tanzania, and only 2.2 kg/year in Zambia. Thus, unlike maize, grain legumes (with a focus on beans and cowpeas) are not *staples* in Zambia, Malawi and Tanzania. Attempts to increase the wellbeing of smallholder producers through grain legumes will require a careful appreciation of the complex forces influencing food consumption (Bandura, 1977; Chadwick et al., 2013) as well as the economics underscoring their production and marketing.

Humans are "hardwired" to prefer certain foods Chadwick et al. (2013), a situation reinforced through social interactions, community taboos, tastes and preferences and public policies. Understanding how these forces shape choices can have significant strategic advantage. What ameliorative power does income, education and other factors that reduce uncertainty about food have on this "hardwiring" of food preferences? And having understood the ameliorative power of these factors, what processes have to be put in place for smallholder farmers and their supply chain partners to seize the revealed opportunities?

The fundamental problem of this project, therefore, is to develop new understanding of the factors influencing consumers' food choice decisions Malawi, Tanzania and Zambia, and use this understanding to facilitate improvements in grain legume value chains. The project has three integrated dimensions. First, it develops an empirical foundation for understanding the factors and the extent that these factors influence food choices. This will be the first empirical evaluation of factors and their complex interactions influencing consumer choice of grain legumes in eastern and southern Africa. Second, the research employs these insights to engage industry stakeholders (government, private businesses, non-governmental organizations, producers, traders, processors, etc.) and public institutions (research institutes, universities, extension, etc.) in a search for value creation and value expansion opportunities

as well as solutions to challenges preventing value chain effectiveness. The third dimension involves using the foregoing information to carefully develop and deliver programs aimed at enhancing strategy development, management and decision-making and other skills of industry stakeholders. In the end, the project provides innovative and unique pathways that bring smallholder producers and the other stakeholders into *specific* alliances to help smallholder producers improve their economic wellbeing.

The project's geographic scope is Zambia, Malawi and Tanzania, all Feed the Future focus countries. These countries represent the different changes that are occurring in eastern and southern Africa: increasing urbanization; rapid economic growth with increasing but unequally distributed incomes; and changing demographics, including in agricultural production. The research findings will provide insights into overcoming domestic consumption barriers and building stronger opportunities for increased trade.

II. Objectives

The solutions envisaged from the above-defined problem are important for elevating the contribution of grain legumes to smallholder farmers' performance. The results are also of interest to breeders who seek direction in producing varieties with higher potential for commercial success and to entrepreneurs seeking grain legume opportunities. They are also interesting to non-governmental organizations (NGOs) seeking to facilitate initiatives that support the broader objectives of Feed the Future initiative and similar Development Partners' efforts in the region, and in Africa as a whole. The project's overall objective, then, is to facilitate the development and execution of private and public sector strategies that enhance growth in the grain legume industry, and in so doing, improve smallholder producer wellbeing. The specific objectives are as follows:

1. Identify and analyze the factors shaping bean/cowpea consumption and their relative positions in consumers' food rankings in the selected countries.
2. Conduct situation analyses for bean/cowpea production and marketing/distribution systems with a view to identifying the nature and extent of the gaps in their value chains.
3. Implement formal and informal capacity building initiatives to address identified gaps and support value chain management capacity across the grain legume industry in the focus countries.

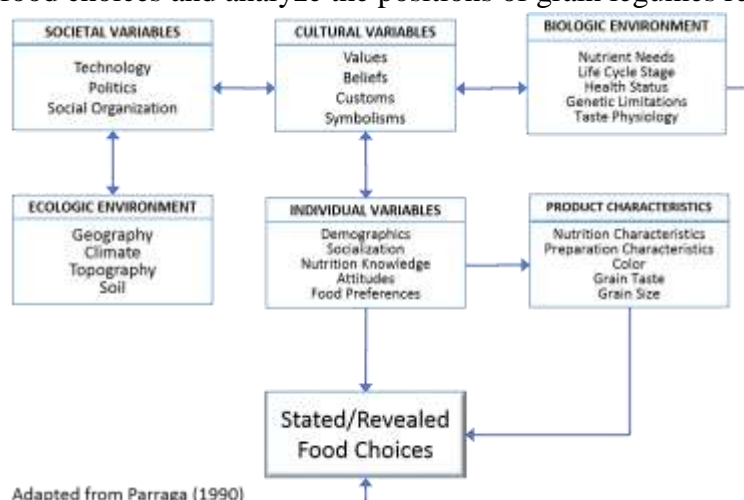
III. Approaches and Methods

Objective 1

Although the research on the complexity of decision-making about food choices is vast, from psychology and dietetics to nutrition (Riet et al., 2011; Vartanian et al., 2008), it has generally overlooked by economists (Traill and Henson, 1996). As a result, strategies to enhance food product demand have been limited to the manipulation of familiar variables understood by economists – prices, incomes and similar demographics. Objective 1 recognizes this complexity in *revealed food choices* and draws on a broader literature to identify and measure the strength of influencing factors in order to craft more effective response strategies. Parraga (1990), for example, describes the factors influencing food choice decisions as interactive, encompassing societal, cultural, ecological, biological and individual variables (Figure). She argues that societal, cultural and ecologic variables interact as do individual, cultural and biologic variables. So, while individual variables and the biologic environment are often the “observed” factors, ignoring the others distorts the measured effects of these factors. Indeed, Chadwick et al. (2013, p. 36) lament that ignoring

these complexities has contributed to failed interventions aimed at altering food choices because the majority of nutritional interventions assume a “conscious and rational decision-making process.”

An adaptation of Parraga’s model is employed to identify the principal factors shaping food choices and analyze the positions of grain legumes relative to six other food groups, i.e.:



Grains and Cereal Products;
Roots, Tubers and Plantains;
Nuts and Pulses (not including beans and cowpeas); Vegetables;
Meat, Fish and Animal Products;
and Fruits. This ranking exercise is accomplished using statistical and econometric analyses the incorporate cultural and individual variables, product characteristics and consumers’ biologic environment. Also included are data on frequency of consumption, quantities

consumed and expenditure shares allocated to the different foods. The estimated rankings will indicate consumers’ “revealed” preferences ranking for the different food groups and indicate grain legumes’ relative position in that ranking. This “revealed” ranking will be compared with stated consumer rankings to evaluate the extent to which cognition influences the rankings. Low influence of cognition in food choices (as observed by Wansink and Sobal, 2007) would imply employment of non-cognitive intervention mechanisms are more likely to succeed in changing food choices. These results will be compared across the three focus countries and between rural and urban consumers.

Stated preference theory and its dominant discrete choice experiment method are primary analytical constructs employed in determining the factors that shape grain legume consumption – the second part of Objective 1. The approach is rooted in random utility theory (Thurstone, 1927; McFadden, 1986; McFadden and Train, 2000; Louviere et al., 2010) and facilitates the exploitation of Lancaster’s (1966) new approach to consumer demand and its variants (Amanor-Boadu and Schnitz, 2008) to evaluate the characteristics of beans/cowpeas that “truly” determine demand. Variables included here are the different product attributes (availability, accessibility, perceived nutritional characteristics (fiber, protein, etc.), preparation time and preparation options, color, grain storage characteristics, taste and size as well as prices). Its unique theoretical strength is that the choice set always includes *at least one feasible alternative*.¹

Because of the ‘random’ in random utility theory, preferences are inherently stochastic. Therefore, the foregoing analytical approach facilitates only the prediction of the probability that an individual i will choose grain legumes. The approach, thus, leads to the development of a family of probabilistic discrete choice models that describe how probabilities respond to changes in the choice options (attributes) and/or the covariates representing differences in individual consumers. Therefore, the probability (ρ) that individual i chooses option j from her set of competing options, C_i , equals the probability that systematic (V) and random (ϵ) components of option j are larger than the systematic and random components of all other options competing with j . That is:

¹ Despite its strong theoretical validity, this approach presents some weaknesses or limitations (Hensher et al., 2005), They are recognized in its application and results’ interpretation of.

$$\rho(j|C_i) = \rho[(V_{ji} + \varepsilon_{ji}) > \max(V_{ki} + \varepsilon_{ki})] \quad \forall j, k \in \{C_i\} \quad (1)$$

The systematic components include attributes explaining differences in the choice alternatives and covariates explaining differences across individuals. The random components, a fundamental aspect of the model's authenticity, capture all the unidentified factors that influence choices. Together, they define the latent utility, u_{ji} , individuals associate with each alternative as follows:

$$u_{ji} = V_{ji} + \varepsilon_{ji} \quad (2)$$

The application of the foregoing novel approaches provide practical outputs for informing strategy and policy development because they yield direct- and cross-attribute elasticities. By being able to provide empirical trade-off cost across attributes, these elasticities can be useful to breeders (under Legume Innovation Lab S01, and national breeders working with or independent of CIAT and CGIAR researchers) and to nutritionists (under S03) in selecting and presenting product attributes desired by consumers in particular markets. The consumer-based nature of the results also provides clear policymaking direction to increase the probability of achieving desired economic, health and social outcomes at both the consumer level and the production level. For successfully implementing demand enhancing policies should create a pull-through to production, contributing to income enhancement and poverty reduction among smallholder producers.

The rural-urban strata is used to determine if there are differences between these two markets across the three countries so that market development effort can be targeted where it creates the highest returns. Therefore, a two-stage sampling process is employed in data collection. The first stage involves targeted selection of a maximum of four regions in each country and selecting two locations (urban and rural) per region. The targeting will be defined by the critical mass of consumers in the identified location. The second stage involves selecting a minimum of 400 households across the selected regions.² For each selected household, the primary person responsible for food purchases will be invited to participate in the choice experiment. The sample will be organized into groups of about 40 and sub-groups of no more than 10 participants per facilitator. This will be the level where the discrete choice experiments are conducted.³

The foregoing suggests we are anticipating doing about 10 choice experiments per country. The principal advantage of this method is its time saving opportunity by conducting the experiments in groups but treating respondents independently. Each group experiment is expected to last between three and four hours and will involve the administration of carefully constructed questions about different attribute-level combinations generated through a well-defined experimental design. To make choice decision easier, we will provide samples of grain legume options so participants are able to see instead of imagine their options. They will be required to rank each of the attribute-level combinations one at a time.

The identified locations in Zambia are Lusaka, Kasama and Chipata. For Malawi, Lilongwe, Blantyre/Limbe and Rumphi. For Tanzania, the identified locations are Mbeya, Arusha and Njombe/Iringa. These locations have been selected to represent the rural-urban stratification of the data. For example, while the population of Lilongwe is in excess of 820,000, Rumphi's is under 20,000. Similarly, Iringa has a population of about 100,000

² Assuming a population of 500,000 households in the selected regions, a confidence interval of 5% and a 95% confidence level, the required sample size is 384. Therefore, the maximum of 400 provides a cushion to address non-response. We will enroll national statistics agencies in each of the three countries to help with the sampling process and get the needed information to recruit the right participant in the data collection process.

³ This implies that we will use a minimum of four facilitators who not only understand the processes being employed in the data collection but also understand the local languages.

compared to Arusha's 1.7 million. So, while market sizes differ across the countries, these comparisons provide an opportunity to assess market development potential in rural and/or urban communities for this industry in the different countries. The results may also offer insights into how they may develop in regional (or even international) trade initiatives.

Because of the project leaders' experience in Zambia, we propose to begin the experiments in Zambia and leverage lessons from there to improve activities in the other countries. Under the assumption that grain legumes are not the highest ranking food group in the selected communities, we will provide participants with a 15-minute presentation on the potential health and other benefits of grain legumes at the end of each experiment session.

The specific outputs from achieving foregoing goals of Objective 1 are as follows: (1) A report detailing the relative position of grain legumes in consumers' food ranking and the factors that define grain legume consumption in the three countries and the response of consumption to changes in the various factors (elasticities); (2) A report comparing the results of the three focus countries; and (3) Policy brief drawing on the foregoing reports to be developed in collaboration with Center for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA) and with Indaba Agricultural Policy Research Institute (IAPRI) in Zambia, INADES Foundation in Tanzania and the Grain Traders and Processors Association in Malawi to leverage their resources to maximize the impact of these reports. Additionally, the Grain Legume Association Ltd., also in Malawi, has agreed to participate in this project. Mr. Chance Kabeghe, Chairman of IAPRI, Mr. Gerald Mgaya, Managing Director of Tanmush in Tanzania and Ms. Grace Mijiga Mhango, Vice President, Grain Traders and Processors Association in Malawi have all been invited to join the research team as collaborators.

Objective 2

There are two components to Objective 2: (1) Situation analyses of primary production; and (2) Situation analyses of downstream activities. The World Bank's nationally-representative Living Standards Measurement Study-Integrated Survey on Agriculture (LSMS-ISA) data for Malawi and Tanzania and the Food Security Research Project (FSRP) dataset for Zambia will be used to conduct the situation analyses of primary production in the three countries. Of particular interest in these analyses is market participation among smallholder producers and its influencing factors. The situation analyses of downstream activities will employ the results from Objective 1 to inform focus group interviews organized to involve industry stakeholders (producer groups, trading and marketing organizations, policymakers, etc.). The scope of issues to be covered include human resource capacity and capabilities, capital availability and accessibility, infrastructure, technology, organizational and management systems, the public policy environment, etc.

Three focus group interviews will be conducted in each country: one with formal sector stakeholders (producer groups, wholesalers, processors, formal traders/shippers, NGOs, trade associations, supermarkets and similar retailers); one with informal sector stakeholders (aggregators, small traders/open market retailers, small food purveyors/restaurants); and one with policymakers (agricultural, health/nutrition, trade, etc.). Each focus group will have a minimum of 20 participants who would be purposefully sampled, with female stakeholders receiving priority and representing no less than 50% where feasible. This is because the issues and challenges facing female stakeholders are often unique. The objective in each of these focus groups is to identify perceived gaps, challenges and opportunities as well as envisioned solutions to addressing the gaps and the challenges and strategies for seizing the opportunities. Our breeding and nutrition research partners from ZARI, SABRN and related organizations will be included in all these conversations. In Zambia, Kennedy Muimui will be the participating breeder involved in these focus group interviews. Dr. Susan Nchimbi-

Msola at Sokoine University of Agriculture and Dr. Rowland Chirwa at CIAT Malawi will be the participating bean breeders in Tanzania and Malawi respectively.

The specific outputs from Objective 2 include: (1) A report describing and comparing the state of grain legume production and market participation in the three countries; (2) Three reports describing and comparing the industry's situation from downstream stakeholders' perspective in the three countries and their perceived solutions to the identified challenges; and (3) A policy document on how public and private policies may be leveraged to enhance the competitiveness of the grain legume industry in each of the three countries.

These documents, together with those developed under Objective 1, will be shared with those who participated in the focus groups as well as distributed extensively across government, industry and trade associations and private sector companies with interest in the grain legume industry. NGOs working with producers and research organizations, such as PABRA and SABRN working on enhancing production performance will be the primary targets for engagement in the dissemination of the results from the research. The reports will form the foundation of a one-day workshop in each country to: (a) formally present and discuss the principal results and lessons from the first two objectives; and (2) explore and craft specific strategies that each stakeholder group (producers, traders, retailers, processors, policymakers, etc.) may pursue as individuals and/or together to enhance their individual and collective wellbeing. Additionally, we will use this one-day workshop to define a curricula that can address the identified knowledge and capacity gaps within the industry and the preferred delivery mechanisms for training programs as well as best dates for such training programs in each country.

Objective 3

There are two goals under Objective 3: Capacity building (both long-term and short-term); and helping interested industry stakeholders implement the appropriate strategies to build and/or enhance the performance of their value chains. There are two targets for short-term capacity building: (i) Industry operators; and (ii) Industry supporters, such as extension agents and NGOs. The specific content of short-term capacity-building outreach programs for each of them will be determined from conversations occurring in the focus group interviews and refined during the one-day industry workshop. However, our experience suggests that short courses on group action are always in demand because of the importance of inter-firm relationships in firm success. We, therefore, envisage delivering short-term courses on cooperative development and management, strategic alliances, supply chain management for maximum chain profit and value management in value chains. These courses will be beneficial to both targets of our short-term capacity building initiatives. Therefore, both groups will be recruited to participate. However, for extension and NGO personnel, we plan to provide facilitation training in these group action initiatives to help them provide the necessary training and support for the individuals and organizations with whom they work.⁴

For industry operators, the principal capacity gaps we envisage are in the areas of management and strategy development and implementation. Thus, we plan to develop a number of short courses in management – record keeping and quantitative decision-making, finance, financial management, marketing, market development, etc. – to elevate the basic management capacity of operators in the industry. We intend to organize these short courses in ways that allow those without any knowledge about specific concepts and constructs to

⁴ Extension and NGO personnel participating in our train-the-trainer programs ensures the dissemination of the knowledge we develop in local languages.

“get” them and those who are familiar with them to enhance their knowledge and capability upon completing each course.

We will *consciously* seek out and recruit private enterprises involved in food security initiatives, women’s groups, trade associations and community based organizations to participate in our capacity building programs. We will draw on the knowledge of each country’s USAID mission and staff at relevant ministries to help identify and recruit beneficiaries of their projects who could benefit from our outreach efforts. In Malawi, for example, we have engaged Ms. Lilly Musaya and the Women in Agribusiness in Sub-Saharan Africa Alliance (WASAA) to collaborate in the recruitment of the members of WASAA into our education programs. The Zambian Farmers Union and Tanmush are collaborating with us in Zambia and in Tanzania respectively.

We will use multiple pedagogies in our training programs. For example, we will identify local organizations that are using group action strategies to achieve their objectives and develop case studies of their activities, challenges and successes for use as instruction and learning material. We will also encourage program participants to engage in discussion as a learning process, whether in synchronous classroom and webcasting programs or using chat tools. We will deliberately organize learning teams to include participants from different segments of the industry so that they can begin to learn from each other, understand each other’s’ perspectives about their problems, opportunities and perceptions of others in the industry. These will be in addition to lectures and other traditional instruction methods.

The number of industry operators and industry supporters participating in these short courses will be an outcome metric for this objective. Another outcome metric will be completion rate. We will provide certificates of completion to participants who complete the non-degree courses we offer. The number of these certificates issued would be a measurable outcome for the outreach and training component of the project’s performance measures.

We anticipate using three distinct delivery mechanisms in our capacity building efforts: traditional classroom delivery; synchronous webcasting; and asynchronous podcasting. The delivery of the defined curricula under the first two options is very similar in that participants have to make the time to join a specific training session in *real time*. However, under the synchronous webcasting mechanism, the content may be archived for current and future participants to listen to it as often as they need and also share them with as many people as they need to share with. The podcasting option allows knowledge providers to build a library of knowledge about specific capacity gaps to meet stakeholder needs. These podcasts may be in various lengths and saved in various formats. However, podcasts for this project will be organized into no more than 15 minutes to facilitate faster downloads and deployment on mobile devices. If a subject requires longer than this limit, it will be divided into 15-minute clips. Both the webcasts and podcasts would be hosted and archived on the project’s website (<http://valuechains.k-state.edu/index.html>).⁵ These delivery methods makes our knowledge delivery plan cost effective, creating an opportunity for access beyond the focus countries.

Specifically, the non-degree capacity building component of Objective 3’s outputs are: (1) The number of short-courses developed for the industry and its supporters in the different delivery formats; (2) The number of participants in training and out outreach programs; (3) The number of certificates of completion offered for short-term courses; and (4) The number of views, listening and downloads of archived webinars and podcasts tracked with Google Analytics.

We propose providing funding for the *equivalent* of **four industry professionals** to take KSU’s MAB program and the equivalent of 12 students to pursue MS degrees in agricultural

⁵ Because of the different technological resources of its multiple clients, Kansas State University provides different approaches for different formats of media online.

economics or agribusiness in the host countries under the degree training component of Objective 3.⁶ The rationale for using the MAB program as a component of our degree training strategy is that students do not have to leave their countries of residence or work in order to get this degree. In countries where firms are already constrained in their access to professionals, the MAB program can be very effective in providing the necessary capacity building without disruptions to operations.⁷ Grain legume industry stakeholders in each country will be encouraged to identify qualified individuals to take advantage of these scholarships. All PIs will participate in supervising and mentoring participating students. Females shall represent no less than 50% of students.

The outputs from the degree programs' component of Objective 3 are the graduates that complete their programs and the theses they produce. We are, expecting to have *a minimum* of sixteen graduates and sixteen theses from this project.

Value chain activity is central to this project. Therefore, we will provide support to individuals and organizations seeking to utilize different group action (cooperatives, strategic alliances, managed supply chains, etc.) using the train-the-trainer programs discussed earlier to elevate the capacity of local extension and NGO personnel to reach larger and more diverse audiences. The number of individuals and organizations supported will be tracked and reported as output under this component of the project.

IV. Collaboration with Host Country Institutions

U.S. and HC PIs are responsible for working together to deliver on the foregoing project objectives. They will work together to develop the experiment designs, survey instruments, sampling frames and schedules for conducting the experiments under Objective 1 and the focus group interviews and workshops under Objective 2. They will work together in the development of curricula and delivering short courses for the non-degree capacity building component of Objective 3 and collaborate in recruiting and supervising the project's graduate students. To lower the supervisory burden, each PI would take the appropriate steps to procure the necessary authorizations at their institution to facilitate supervisory status for their colleagues. All PIs are responsible for conducting the analyses and writing reports once data collection is completed in each country.

HC PIs are responsible for all the logistics of the experiments, focus group interviews, workshops and non-degree training programs in their respective country. For example, they will ensure collaboration with their country's official statistics agency to facilitate sampling and contact information. They are also responsible for recruiting the appropriate person in each household to be available to participate in the discrete choice experiment. They will organize the necessary logistics to ensure that individuals selected to participate in the discrete choice experiments get to the locations where the experiments are being conducted. Their efforts would include paying for participants' transportation and arranging for refreshments during all data collection events as well any other relevant compensation.

Given the localness of private partnerships, HC PIs are designated to manage the relationships with private partners in their respective countries, ensuring they are invited to meetings and participating in the relevant activities. For example, they are responsible for ensuring that our breeder colleagues are fully engaged in all our activities. In short, HC PIs

⁶ The actual numbers could be higher if only partial scholarship is provided for these degrees. For example, getting their employers to contribute 50% of the MAB tuition could double the number of students being put through the MAB program. Similarly, funding MS students only for their thesis projects could allow a higher number of students to be funded.

⁷ The students' employers and industry as a whole benefit prior to students graduating because the program encourages students to bring work challenges to their classrooms, allowing their firms to get faculty support in addressing pressing challenges in their operations.

shall secure all necessary collaborations from both private and public organizations in their countries to support the achievement of the project's objectives.

Finally, to ensure sustainability of the project's results after 2017, HC PIs will be the "face" interacting with USAID Missions in their countries so that they can continue building on relationships developed during the project. Finally, the cost-based sub-contracting approach demands that HC PIs manage funds for which they have responsibility in ways that ensure objectives are achieved on time and on budget.

V. Coordination with Other International Grain Legume Research Programs/Projects

This project has a lot to contribute to and benefit from CIAT's Consortium Research Program (CRP 3.5) including ICRISAT, CIAT, ICARDIA and IITA aiming to leverage legumes to combat poverty, hunger, malnutrition and environmental degradation. Hence, every effort shall be made to build the appropriate alliances with CIAT staff working in the region directly or through SABRN, participating institutions and other CIAT partners. We collaborated with SABRN on our project in Zambia and will continue to explore extensions for broader collaborations. They will be invited to participate in all aspects of the project, include the survey instrument development phase so their needs can be recognized.

VI. Outputs

The principal output from this project is enhanced capacity among industry stakeholders and decision-makers. This is achieved through research-guided development of short courses that would aim at improving the management and decision-making capacity at all stages along the grain legume supply chain. The industry's knowledge depth will also be enhanced by training four industry professionals in the MAB program as 12 new MS students with more in-depth knowledge about the industry's challenges and opportunities.

Table 1 shows the project's Gantt chart by tasks under each objective and the related outputs. A careful look at the table reveals that the project is divided into two phases. The first phase covers data collection and analyses to inform the researchers, the industry and policymakers about the nature, challenges and opportunities in the grain legume industry in the focus countries.

The second phase begins after workshops to present the research results to industry stakeholders and policymakers. These workshops also help identify and define the industry's capability and knowledge gaps in each country. The second phase involves the development and delivery of outreach and short-term training for the different segments of the industry, each organized to meet the specific needs identified in the research.

In both phases, we will work closely with the industry, engaging private sector organizations to collaborate, advice and direct various activities to ensure effectiveness and sustainability of our efforts. We will also work closely with them to identify firms and groups driving the industry towards its goals and could benefit from knowledge support.

The table also shows that Objectives 1 and 2 activities in Zambia are started and completed before proceeding to the other two countries. This is deliberate: It allows us to use our prior knowledge of Zambia to discover any challenges that may occur in the execution of the research and capacity building initiatives so that we can undertake corrective actions in the other countries. Once corrective actions are taken, activities in Malawi and Tanzania are undertaken simultaneously. We also show that our train-the-trainer initiatives will commence prior to the industry capacity building efforts because there are some fundamental training that we can provide prior to completing our research. Additionally, we intend to initiate

support and capacity building initiatives for innovative governance mechanisms to enhance operational efficiency in the industry prior to completing the research on needs assessment.

We will work closely with government agencies – from the statistical agencies (to help with sampling) to agricultural policymakers throughout the project. We will involve our breeder and nutrition partners in all our activities, inviting them to all our activities. This is in line with this project being a whole industry effort focused on **enhancing the performance of the whole chain** – from genetics improvement through production to trading and to consumption.

Table 1: Gantt Chart and Related Outputs by Objective

Task	Start	End	Outputs
Objective 1	Jan-14	Jun-15	
<i>Develop survey instrument</i>	Jan-14	Jan-14	
<i>Test & refine the instrument</i>	Jan-14	Jan-14	
<i>Conduct survey in Zambia</i>	Jan-14	Mar-14	
<i>Analyze Zambian survey data</i>	Apr-14	Jun-14	
<i>Produce report for Zambia</i>	Jul-14	Sep-14	Report
<i>Conduct survey in Malawi</i>	Oct-14	Dec-14	
<i>Analyze Malawian survey data</i>	Jan-15	Mar-15	
<i>Produce report for Malawi</i>	Apr-15	Jun-15	Report
<i>Conduct survey in Tanzania</i>	Oct-14	Dec-14	
<i>Analyze Tanzanian survey data</i>	Jan-15	Mar-15	
<i>Produce report for Tanzania</i>	Apr-15	Jun-15	Report
Objective 2(a)	Oct-13	Dec-14	
<i>Primary production situation analysis in Zambia</i>	Oct-13	Dec-14	Report
<i>Primary production situation analysis in Malawi</i>	Oct-13	Dec-14	Report
<i>Primary production situation analysis in Tanzania</i>	Oct-13	Dec-14	Report
Objective 2(b)	Oct-14	Jan-16	
<i>Conduct industry focus groups in Zambia</i>	Oct-14	Dec-14	
<i>Produce report for Zambia</i>	Jan-15	Mar-15	Report
<i>Launch report & conduct industry workshop in Zambia</i>	Mar-15	May-15	Workshop
<i>Conduct industry focus groups in Malawi</i>	Jul-15	Sep-15	
<i>Produce report for Malawi</i>	Sep-15	Oct-15	Report
<i>Launch report & conduct industry workshop in Malawi</i>	Nov-15	Jan-16	Workshop
<i>Conduct industry focus groups in Tanzania</i>	Jul-15	Sep-15	
<i>Produce report for Tanzania</i>	Sep-15	Oct-15	Report
<i>Launch report & conduct industry workshop in Tanzania</i>	Nov-15	Jan-16	Workshop
Objective 3	Jan-14	Sep-17	
<i>Degree Programs (MS, MAB)</i>	Jan-14	Sep-17	Degrees & thesis
<i>Conduct train-the-trainer sessions in all countries</i>	Apr-14	Jun-17	Short courses
<i>Facilitate of governance systems in all countries</i>	May-14	Sep-17	Outreach
<i>Conduct industry capacity building activities</i>	Feb-16	Sep-17	Short courses

VII. Capacity Building of Partner Host Country Institutions

With specific reference to the academic institutions with whom we are collaborating, we are planning numerous knowledge building initiatives to enhance our partners' research and publishing opportunities. For the broader host country institutions, we will bring our current and ongoing linkages to initiatives, such as the African Agribusiness Consortium (AAC) (http://www.aagri.net/page/about_us/consortium.html#) (funded by Gates Foundation) and the International Food and Agribusiness Management Association (<https://www.ifama.org/>) to support capacity building. The lead US PI is involved in both of these initiatives as the

lead faculty development facilitator for African business and agribusiness faculty and the lead instructor of the pilot agribusiness management program in Ghana.

The capacity building initiatives defined in this project are designed to be both cost- and operational-effective. Building the capacity of industry decision makers in the proposed manner would enable them to (1) think critically about their options before choosing; and (2) assess the economic outcomes of their alternatives before acting. Systematically developing short courses to fill identified and emerging skills and knowledge gaps contributes to this focused capacity building initiative. By using multiple pedagogical approaches and delivery mechanisms, we are able to reach a broader segment of the industry. Because the industry's challenges are symptomatic of the sector and generally apply to most small and medium sized businesses, we believe the benefits of our capacity building efforts in the host countries private and public institutions would reach beyond the primary targets of this project.

VIII. Alignment with USAID Feed the Future Goals and Strategic Research Objectives

Alignment

In working to achieve its overall objective, the project is intimately aligned with the broad goals of Feed the Future initiative. Specifically, our project is aligned on the following indicators:

- Indicator # 1: Long-term training (degree programs) in Objective 3
- Indicator # 2: Short-term training programs defined under short courses and outreach programs in Objective 3
- Indicator # 3: Rural participants in discrete choice experiments under Objective 1
- Indicator # 4: Private enterprises, producer associations, women's groups, trade associations, and community-based businesses participating in outreach programs and short courses and benefitting from special support services in Objective 3
- Indicator # 5: Emerging PPPs resulting from our programs and strategy development sessions in Objective 2 and Objective 3
- Indicator # 7: New value chain management practices in Objective 2 and Objective 3
- Indicator # 8: New policy initiatives (forums, public debates/stakeholder consultations in Objective 2 and continuing conversations during our short courses.

Gender Equity

Females dominate food shopping in most households, even in developed countries. This implies to understand consumption habits of families and influence any significant changes in household food choices, one cannot err spending time to females. This is why we believe a large proportion of participants in our discrete choice experiments would be female and they would get the opportunity to learn more about the health and nutritional benefits associated with grain legumes. In our engagement efforts along the chain, we have taken special care to identify women organizations, such as the WASAA, to provide the research team with insights into the special needs of women agribusiness professional, including producers. We will continue to engage institutions and organizations, such as USAID missions in the host countries, to help us engage other women organizations that they believe would benefit from our efforts into this project. In recruiting for our train-the trainer programs, we will specifically recruit females from both the extension agencies and NGOs to ensure that gender equity is maintained. Finally, in recruiting students for the degree programs, a minimum of 50% of students recruited for degree programs will be female.

USAID Mission Engagement

The Sustainable Economic Growth Office of USAID/Malawi is the local mission group that is closely aligned with this project. In Tanzania, the relevant mission offices to engage are the Agriculture and Food Security Office and the Economic Growth and Trade Office. We are working with our contacts at other missions and at USAID Washington to identify the appropriate personnel and build the appropriate connections to facilitate a visit with the right officers at these missions in the near future. In Zambia, the Economic Growth Office is the group we have been dealing with and are planning to continue working with its officers. At the outset of our new project, our plan is to engage the right officers in these missions for two things: (1) Apprise them of our project and its objectives; and (2) Solicit their help in ensuring that our efforts and theirs are aligned in achieving Feed the Future objectives. We will also make the missions aware of our availability to perform specific services for them if such services support our collective objectives under the Feed the Future initiative. In the end, we want to leverage our collective resources to enhance our project's impacts.

IX. Impact Pathway Plan

The project's impact pathway plan is appended in Table A1. There are two principal outputs from this project: (1) Research-based evidence-supported reports on the state of the grain legume industry – from the perspectives of consumers and those who make their living in the industry; and (2) Knowledge dissemination through non-degree short courses and through degree programs that offer masters' degrees; and outreach effort that provide operational support for industry stakeholders, including policy makers.

The research provides the foundation for all other impacts associated with this project. Therefore, the research results will be beneficial to breeders in pursuing projects with higher potential for commercial success and help food product developers and nutritionists.

The capacity building initiatives – both non-degree and degree – are expected to impact individuals' productivity by enhancing their capabilities in decision-making and execution. They are also expected to influence their employer's performance. These initiatives are also expected to improve policymakers' appreciation of the industry's value and help them develop the right policies to create the desired outcomes for the industry.

The ultimate impact of the project's activities is to increase the harvested area of grain legumes by an average of 3 percent per annum over the next decade. Based on FAO (2012) harvested area, this growth will result in an increase of about 22,000 ha in Zambia, 105,000 ha in Malawi and a little under 1.08 million ha in Tanzania. These are equivalent to a 35% increase over 2012 harvested areas. Access to the appropriate genetics over this period and favorable shifts in consumer preferences over the decade could lead to better outcomes. In the short-term, we are hoping for doubling of the number of structured vertical and horizontal relationships.⁸ The logic steps in achieving this impact begin with the dissemination of research reports widely to policymakers and industry decision-makers, collaborating with advocacy partners in doing aggressive policy advocacy through briefs, advisory meetings, conferences and mass media initiatives, focusing significant effort on building the industry's human capacity. It requires leveraging the efforts of both private (NGOs) and public sectors (extension agents) to improve skills and business decision-making to achieve the desired impact. It is also hoped that the industry's performance and the overall attractiveness of the food and agribusiness sector would ensure that 100 percent of the students benefitting from this project are working in this sector in the next decade.

⁸ We are awaiting the data on baseline numbers of formal inter-firm relationships in this industry in the different countries. The impact result will be modified after we get the baseline numbers.

References

- Amanor-Boadu, V. and C. Schnitz. 2008. "Consumers and the Evolution of New Markets: The Case of the Ethical Foods." Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Dallas, TX, February 2-6, 2008. URI: <http://purl.umn.edu/6752>.
- Bandura, A. 1977. *Social Learning Theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bridle, K. and L. Bonney. 2010. "Food For Thought: Biodiversity Management on Farms - Links To Demand-Driven Value Chains." *Social Alternatives* 29(3): 31-38.
- Chadwick, P. M.; Crawford, C.; Ly, L. 2013. "Human food choice and nutritional interventions." *Nutrition Bulletin* 38(1): 36-42.
- Hensher, D.A., J.M. Rose and W.H. Greene. 2005. *Applied Choice Analysis: A Primer*. Cambridge: Cambridge University Press.
- Lancaster, K. "Change and Innovation in the Technology of Consumption." *The American Economic Review*, 56 (1966):14-23.
- Louviere, J.J., T.N. Flynn and R.T. Carson. 2010. "Discrete Choice Experiments are not Conjoint Analysis." *Journal of Choice Modelling* 3(3): 57-72.
- McFadden, D. 1986. "The Choice Theory Approach to Market Research." *Marketing Science*, (5): 275-279.
- McFadden, D., and K. Train. 2000. "Mixed MNL Models for Discrete Response." *Journal of Applied Econometrics* 15 (15): 447-470.
- Parraga, Isabel. 1990. "Determinants of Food Consumption." *Journal of the American Dietetic Association* 90 (5): 661.
- Riet, J. van't; Sijtsema, S. J.; Dagevos, H. and G-H. De Bruijn. 2011. "The Importance of Habits in Eating Behaviour. An Overview and Recommendations for Future Research." *Appetite* 57(3): 585-596
- Thurstone, L. L. 1927. "A Law of Comparative Judgment." *Psychological Review* (34): 273-286.
- Traill, B. and S. Henson. 1996. "Consumption Implications of Agri-Food Policies." *Proceedings of the Nutrition Society* 55 (2): 649-659.
- Vartanian, L.R., C.P. Herman and B. Wansink. 2008. "Are We Aware of the External Factors that Influence Our Food Intake?" *Health Psychology* (27): 533-538.
- Wansink, B. and J. Sobal. 2007. "Mindless Eating: The 200 Daily Food Decisions We Overlook." *Environment and Behavior* (39): 39-106.
- Zylberberg, Ezequiel. 2013. "Bloom or bust? A Global Value Chain Approach to Smallholder Flower Production in Kenya." *Journal of Agribusiness in Developing and Emerging Economies* 3.1 (2013): 4-26.

Project Budget

The budget is divided into six principal categories: (a) Personnel Cost, covering both salaries and fringe benefits; (b) Travel; (c) Equipment (only if above \$5000); (d) Supplies, covering the consumables that support the research activities; (e) Training, broken into degree and non-degree training to enhance human capacity for HC; (f) Other costs, defined to capture costs associated directly with data collection, internet connection charges for HC PIs and fund transfer costs to HCs.

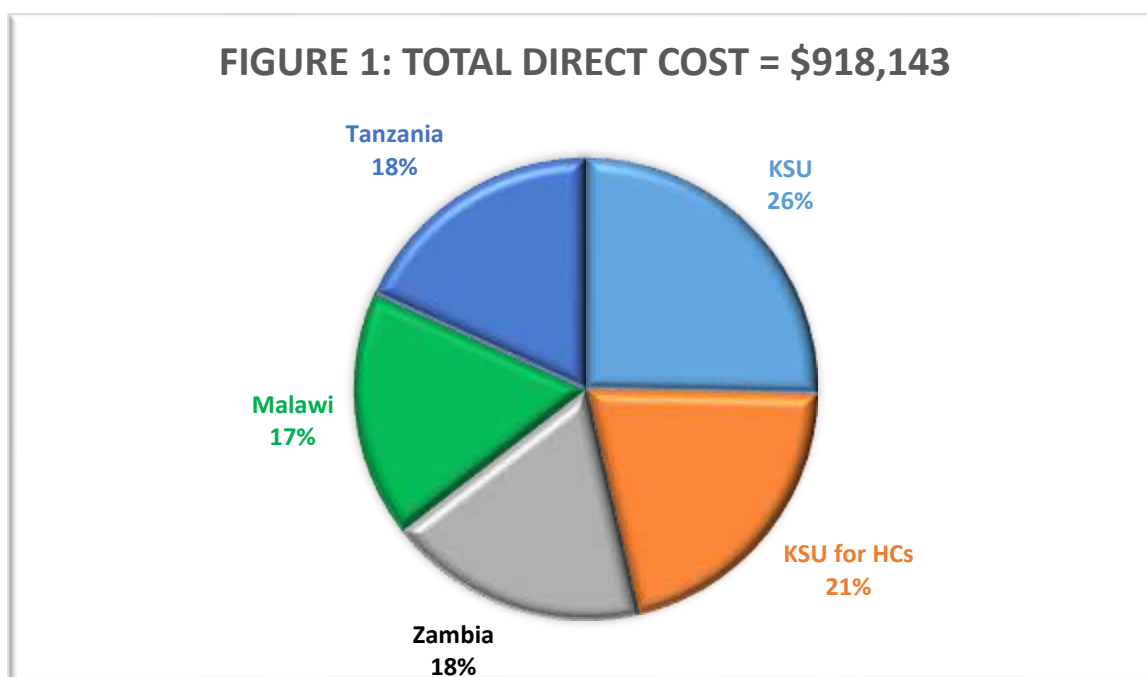
The budgeted personnel costs cover one month summer salary for the US PI in the first year of the project and 1.5 months for the remaining years of the project. The US PIs will be intimately involved with all aspects of the project and that implies a couple of trips to each country for the different activities. To improve efficiency, travel will be organized in such a way as to do a number activities in the region on each trip. As much as possible, the PIs will participate in all data collection initiatives together. This explains the allocations for travel in the budget. It is also assumed that \$20,000 is allocated to support MAB student travel to the US.

Supplies covers computer and software purchased for faculty and program students. It is assumed that each HC PI would receive a fully-loaded computer to ensure they have the tools to do the work envisaged under this project. The unit price of these machines is assumed at \$2,500, using KSU's purchasing advantages. Additionally, each program student gets a computer with licensed Microsoft Office and STATA®. The assumed unit price for the students' machines is \$1,500.

The average cost per participant in the discrete choice experiment is assumed at \$50, including the cost of facilitators hired who are not project participants. HC PIs are responsible for managing the budgeted \$20,000 to get the data from the 400 sample size. The focus group interviews are also allocated a budget of \$12,000 while the industry workshop is allocated a budget of \$5,000. HC PIs may solicit support from other sources – USAID, industry, and government – to supplement this industry workshop budget if the allocation is found to be inadequate. The cost of transferring funds to HC PIs is assumed at \$250 per annum for all three countries.

The HC MS program support is assumed at \$5,000 per student while the MAB program support is \$30,000 per student. As indicated in the technical proposal, we will make every effort to get students who can get some support from their employers or from other sources in order to stretch our degree training dollars. There are four MAB students and a dozen MS students assumed under the project.

Under the foregoing assumptions, the total budgeted cost of the project for whole duration is estimated at approximately \$1.09 million. This includes the budget allocated to undertake the team meeting in spring 2013 in Lusaka. It also includes a total indirect cost of approximately \$124,000 for Kansas State University, a savings of about \$4,500 using an indirect rate of 48 percent instead of the prevailing 50 percent. This indirect cost includes \$12,000 which is the amount associated with the subcontracts for the HC. The foregoing implies a total direct costs of \$918,143 distributed as in Figure 1 among the four partners in the program. Of this total, approximately \$193,000 (21%) is spent on behalf of the HCs in the form of supplies and tuition and travel for the MAB students. This implies that about 74 percent of the total direct funding is spent directly or on behalf of HCs.

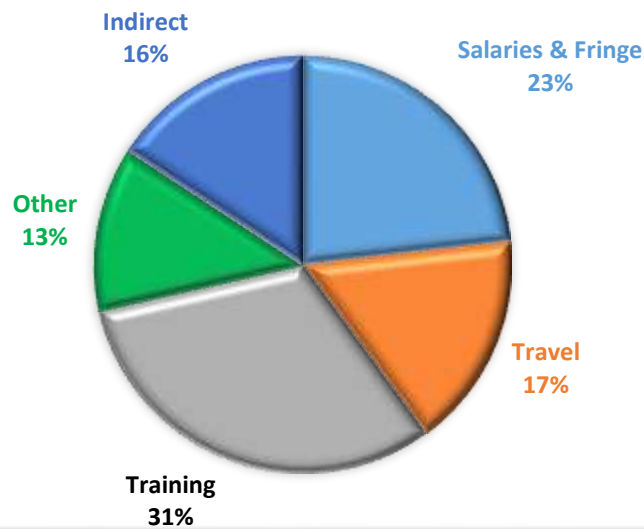


A 30 percent minimum budget allocation is set for capacity development. The total allocation for capacity building, defined to encompass degree and non-degree training and the related travel and supplies (essentially computers) amounts to \$343,700. This amount is 37.4 percent of total direct costs and about 31.5 percent of total project costs, including indirect costs.

The distribution of the total budget among the principal budget categories is presented in Figure 2. It shows that all salaries account for 23.2 percent of total budget compared to 16.8 percent for travel, 12.8 percent for other and 31.5 percent for training. The remainder is the allocation to indirect costs. None of the allocated funds is going to fund administrative staff in this project. It is often deceptive to evaluate the time of our African scholars by the salaries paid by their institutions. This is because most of the good professionals have excellent consulting remunerations that dwarf their salaries at their institutions.⁹ Therefore, getting these professionals to collaborate on projects such as this one should be viewed in terms of the opportunity cost of consulting and not of their “day jobs.” When viewed through those lenses, the professionals we have collaborating with us on this project are doing it for the “good of country” because the compensation offered is not comparable to their consulting remunerations. This is noted here only to point out the competition that confronts projects such as this one in Africa when it comes to recruiting good professionals and getting their commitment to engage and perform. Therefore, the US PI is extremely honored and privileged to have on this research team an old partner and collaborator, in the person of Dr. Gelson Tembo of the University of Zambia, and new forged relationships with Dr. Fredy Kilima and Dr. Lawrence Mapemba of Sokoine Agricultural University in Tanzania and Lilongwe University of Agriculture and Natural Resources in Malawi.

⁹ The current interest of the global development community – USAID, World Bank, IMF, IFAD, GIZ, etc. – in Africa has placed significant pressure on recruiting agricultural economists and agribusiness professionals to participate in research for the benefit of knowledge creation and outreach. This is purely a question of supply and demand.

**FIGURE 2: DISTRIBUTION OF TOTAL BUDGET
AMONG PRINCIPAL ITEMS**



The distribution of expenditures by year is presented in Figure 3. It shows that the highest expenditures of nearly \$300,000 occurs in 2015, followed by 2014 and 2016 with approximately \$219,000 and \$163,401 respectively. In terms of the annual share of total direct expenditure, 2015 accounted for nearly 32 percent, followed by 2014 at 23.8 percent, then 17.8 percent for 2016, 14.9 percent for 2017 and 11.6 percent for 2013. Training's share of the budget allocation exceeds all other expenditures in two of the five years. It was nearly 50 percent of total budgetary outlay for 2014, 38.2 percent in 2015 and 34.0 percent in 2016.

FIGURE 3: DISTRIBUTION OF EXPENSES BY YEAR

