Dry Grain Pulses CRSP Proposal

COVER PAGE (must print on one page)

Title of Proposal: PULSE VALUE CHAIN INITIATIVE—ZAMBIA (PVCI—Z)

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<table>
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<th>Proposed Project Period: (33 months maximum, between June 1, 2010-September 30, 2012)</th>
<th>Total federal funds requested</th>
<th>Total non-federal cost share commitment by U.S. institution(s)</th>
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<th>Proposed HC institutions to be sub-contracted (abbreviated name):</th>
<th>Proposed budget for a sub-contract to a HC institution</th>
<th>Are you requesting the ME (MSU) to manage the Fixed-Price sub-contract for this HC Institution? (Yes/No)</th>
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<td>University of Zambia</td>
<td>$233,681</td>
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Authorized lead U.S. institutional representative (type name, phone number and email):
Paul R. Lowe, 785-532-6804; plowe@ksu.edu

Signature: ________________________________         Date: ______________
The Pulse Value Chain Initiative—Zambia (PVCI-Z) vision is to contribute to poverty alleviation and improve food and nutrition security through research, education and engagement. It works towards this by conducting research to address identified knowledge gaps about bean and cowpea value chains in Zambia, determine the most efficacious value chains given producer and partner characteristics and work with industry to develop and construct value chains that help increase producer incomes and improve food and nutrition security.

The implementation is divided into two categories. Category I focuses on developing baseline knowledge about the Zambian bean and cowpea industry and using the information about production value created in the different supply chains as benchmarks for tracking future performance at the different loci in the industry. The project tests several hypotheses about producer choice of value chains and their demographic and operational characteristics, using the results to inform policy and strategy development. Category II involves identifying specific producers to participate in pilot value chains and to use their participation experience to build their value chain management skills and capabilities. These improvements would help them negotiate and develop managed value chains that enhance their incomes, reduce income variability, and improve food and nutrition security. Finally, we provide training for six final year undergraduate students and three MS students at the University of Zambia and three MAB students at Kansas State University. We also provide short-term specific workshops on research and management for staff at UNZA and other project collaborating organizations.

**Pulse Crop of Focus**

- Beans
- Cowpeas
- Other (specify)

**Topical Areas to be Addressed By this Project**

Select one or more from Topical Areas 1-3

1. Enhancing Biological Nitrogen Fixation (BNF) in common bean and cowpea production systems
2. Achieving nutritional security for improved health of target populations
3. Improving the performance and sustainability of pulse value-chains

Select at least one from Global Theme D

1. Building and promoting partnerships with key stakeholders
2. Strengthening regional dry grain pulse commodity research networks
3. Training young scientists in the use of modern tools for research, management and outreach

**Summary Checklist**

- Project devotes at least 30% of project funds on HC capacity building activities (Global Theme D) (give total %) **60.59%**
- Project involves research on biotechnology as defined in the RFP (give % effort on biotechnology)
- Project involves the use or generation of genetically modified organisms (GMOs)
- Project involves human subject approval
- Project involves animal use approval
- Project involves M.S. or Ph.D. degree training of HC personnel (how many?) 3 M.S. and 3 MAB
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Problem Statement and Justification

*Vision:* Pulse Value Chain Initiative—Zambia (PVCI-Z) contributes to poverty alleviation and improve food and nutrition security through research, education and engagement.

Zambia has chronic food and nutrition security problems despite its rich agricultural resources. These arise, in part, from its inability to capitalize on these resources because of inefficient policies and inadequate human resource capacity in its agriculture and food sector as well as an increasing intensity, frequency and duration of droughts and floods. The Government of the Republic of Zambia and various governmental and non-governmental organizations are working to address these challenges, and beans and cowpeas have been identified as food security-enhancement crops because of their drought tolerance characteristics (Bebe et al., 2008; Munoz-Perea, 2006; Kawano, 2003).

Numerous institutions, including CRSP, have invested significant resources in the production science of beans and cowpeas—breeding, husbandry, pest management, biological nitrogen fixation, harvesting, storage, etc. However, knowledge about bean and cowpea value chains is sparse in many places despite strong recognition of their importance (Fulton et al., 2008). Economics is important in producers’ resource allocation decisions. Therefore, understanding the industry’s supply chains, their relevant costs and benefits, the embedded transaction costs as products move to consumers, and the influencing public and institutional policies are critical in facilitating growth in Zambia’s bean and cowpea industry to achieve the dual objective of enhancing food and nutrition security and increasing producer incomes. Better information about stakeholders’ economic and marketing decisions would facilitate improved stakeholder decision-making and facilitate effective policymaking by businesses, government and non-governmental organizations operating in the Zambian pulse industry to help it contribute to addressing the food and nutrition security challenges (Zotor and Amuan, 2008).

Research Problem

Harvested area and total production for pulses in Zambia increased steadily at about 5.6 percent and 6 percent per annum between 1998 and 2008, but yield has been virtually flat over the same period, with a growth rate of about 0.4 percent/year (FAOStat.org). While pulses (as a crop category) are produced in all nine Zambian provinces, their shares of total allocated area and market value are relatively small. For example, estimated market value for 2008 was about $5.2 million, which is only 3.4 percent of corn’s market value. Despite this, Zambia’s second Supplemental Survey (CSO/FSRP, 2004) indicates that about 10 percent of households grow pulses, compared with 39 percent for corn and 4 percent for sorghum. This suggests that the strategic importance of the bean and cowpea industry can be improved by improving knowledge about its value chain economics and its influencing factors.

Although produced in all Zambian provinces, bean and cowpea production is very concentrated. Northern Province alone accounted for 62 percent of bean production while Southern Province accounted for 58 percent of cowpea production. The other major bean-producing provinces—Central, Northwestern and Luapala accounted for less than 10 percent each. Similarly, the other major producing provinces, Central, Northern and Lusaka accounted for between 11 and 6 percent.
Credible information on the flow of pulses through the supply chain and the value (net benefits) at each stage in the chain is sparse. Although products flow out of the country in regional trade, the proportion flowing out and the stage at which it occurs have not been captured and analyzed. Therefore, the effects of trade flows and distribution channels on performance at each stage in the supply chain are currently unknown. The characteristics and capabilities of producers and others in the supply chain and the specific roles these play in the distribution channels they adopt are also unknown. Yet, they are critical in explaining the effects of infrastructure constraints and policy gaps on producer incomes and on food and nutrition security. They are also important in understanding the factors influencing investments in bean and cowpea production, processing, handling, distribution and trading systems as well as identifying the human resource capacity and capability needs for achieving the bean and cowpea industry’s objectives.\(^1\)

**Project Objectives**

The overall purpose of this project is to contribute to the Dry Grain Pulses CRSP overall goal of alleviating poverty and enhancing food and nutrition security. It does this by improving knowledge about the economics of bean and cowpea supply chains in Zambia using strategic management (Dees and Lumpkin, 2001) and industrial organization (Scherer and Ross, 1990) frameworks. The project also has the objective of building Zambia’s human capacity.

The specific objectives are divided into two categories, thus:

**Category I: Development of Baseline Knowledge and Benchmark Metrics**

1. **Identify the different supply chains used by the Zambian pulse industry and describe the characteristics of those using them at the different loci of the supply chains.**

   This objective describes the types of supply chains in the pulse industry (Figure 1), exploring their structures by estimating the proportion of participating producers and the quantity of beans and cowpeas share going through them. It also evaluates the degree of concentration in the industry and the domestic and regional trade distribution of Zambian beans and cowpeas.

2. **Identify and estimate the effects of stakeholder characteristics on producers’ supply chain participation decisions.**

   Decision-makers’ competence—based on their knowledge, information processing ability, resource situation and solution implementation capacity— influences their choice of supply chains (Schoenherr et al., 2010). For example, small producers would generally sell to first handlers (aggregators) or directly to local consumers based on their location. They hardly sell to hotels, restaurants and institutions (HRI) because they lack the critical mass. This objective uses producers’ demographic and operational data (gender, education, location, age, firm size, etc.) to estimate supply chain participation decisions. Achieving this objective provides information into how to maximize value through the construction and operation of supply chains.

3. **Describe and estimate the pecuniary and non-pecuniary value accruing to the different supply chain participants.**

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\(^1\) We use supply chain to refer to the system of organizations/individuals involved with moving products, services and information between producers and consumers. Value chain is used specifically to describe the economic and social value embedded in supply chain operations. It involves tracking and analyzing direct pecuniary and non-pecuniary benefits and costs at each locus in the supply chain. This perspective is, thus, broader than Porter’s (1985) conceptual framework.
This objective uses market and non-market valuation techniques (Becker, 1988; Sun and van Kooten, 2009) first to describe and then measure the types of value participants perceive they receive from their economic activities. It is based on the recognition of the effect of supply chain characteristics on coordination and other costs for participants (Stringer et al., 2009). Its purpose is to identify if the types and level of perceived value differ by demographics and type of supply chain used. For example, it is plausible to expect value to be significantly monetary for a trader and a complex monetary and non-monetary mix for a farmer balancing household food security and income.\(^2\)

4. Identify the institutional and policy issues influencing value creation and determine if any effect differences exist by crop, location, gender and stage of the chain.

This objective collects information from producers and other supply chain participants as well as public and private agencies to assess the effects policies and institutional arrangements on value creation and capture by various demographic and operational characteristics. The results will help identify modifications to these policies and institutional arrangements to reduce poverty and enhance food and nutrition security.

5. Use the results from the foregoing to develop policy recommendations to improve producers’ ability to increase the value they receive from supply chain transactions.

The results from Objectives 1 – 4 provide baseline knowledge about Zambian bean and cowpea supply chains and benchmarks for value accruing at the different stages in each chain. They also provide information about stakeholders’ perceptions about the effect of different policies and institutions on their performance. This objective uses the results to identify policy and institutional changes that need to be modified to increase stakeholders’ performance. It also identifies knowledge and skills gaps that may be improved through education and engagement.

Category II: Alternative Governance Systems’ Effects on Value Creation and Capture

Inter-organizational relationships range from spot market transactions to vertical integration, with joint ventures, contracts, strategic alliances, and cooperatives in-between this continuum. There is evidence that transaction cost may decline as one moves from spot markets to integration, and may increase beyond a certain point (Hobbs, 2001). However, participation in value chains is influenced by willingness and ability to make tangible and intangible investments (time, trust, etc.) and the nature of the traded product (Amanor-Boadu and Starbird, 2005; Laeequidedin and Sardana, 2010). Knowledge about participants, their needs and capabilities

\(^2\) For example, the contribution of beans and cowpea leaves and green pods to household food and income prior to dry grain harvest and sale has to be included in the value estimates.
can be helpful in constructing effective value chains.

The results from Category I activities address this information gap, allowing us to identify and assess the extent and types of systems and the value they each generate. Under Category II activities, we pilot alternative governance systems to assess the effect of skills and capability improvement on specific producers’ wellbeing. The results would provide tools for helping producers participate in value chains that match their characteristics, capabilities and production objectives. The pilot activity involves the following specific objectives:

1. *Work with specific industry stakeholders to pilot different governance systems to identify the factors and participant characteristics influencing performance.*

Because of the multiple objectives that may influence investments in production and other activities at various stages of the supply chain, we measure performance broadly by recognizing pecuniary and non-pecuniary variables. Each pilot program participant’s performance will be measured prior to commencing the experiment and tracked throughout the experiment. We will select participants based on demographic and operational factors, ensuring gender diversity. The results from this activity would provide lessons and information about the efficacy of alternative governance systems in enhancing producer incomes given participants’ characteristics.

2. *Use the pilot activity’s results to develop outreach programs, program advocates and program advisory support systems to help producers and their partners develop the requisite skills to improve their economic well-being.*

The pilot program will become the teaching laboratory for helping us identify the participants’ skills and capabilities in effective participation and management of their value chains. Therefore, we will use the information collected throughout the program to develop education and outreach programs that address the gaps in skills and capabilities we discover. The results will provide insights into the challenges and, hence, solutions to developing and managing value chains for performance. They will allow us to develop a document to help facilitators of value chains for smallholder producers match producers and their downstream partners to the appropriate governance system.

### Data Collection Methods for Category I

We will use structured and semi-structured questionnaires to collect primary data from two distinct groups in the pulse industry: (a) The Trade; and Supporting Institutions. The Trade comprises producers, traders, and buyers. The Supporters include producer associations (e.g., Zambian National Farmers Union (ZNFU) and Central Growers’ Association (CGA)), Ministry of Agriculture and Cooperatives (MACO), NGOs such as Famine Early Warning System Network (FEWSNET)³, Oxfam, World Vision, and USAID country mission.

#### Trade Data Collection Approaches

Central Statistics Office (2008) data on small- and medium-scale holdings show that 73 percent of bean production and 58 percent of producers are in 10 districts in Northern Province while about 41 percent of cowpea producers and 45 percent of production are in seven districts in Southern Province. Indeed, 16 districts account for 90 percent of bean production and 78 percent

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³ FEWSNET collects and publishes monthly market information on informal cross-border trade in commodities. Our relationship will help us identify the right traders and facilitate our data collection.
of bean producers while 18 districts account for 90 percent of cowpea production and 83 percent of its producers.4

Following the CSO – and to ensure comparability with other national surveys – standard enumeration areas (SEAs) will be used as primary sampling units in each project district. A two-stage stratified cluster sampling procedure is proposed, involving probability proportional to size (PPS) sampling of SEAs (the clusters) at the first stage and systematic sampling of households from each selected SEA at the second stage. PPS at the first stage is particularly important to ensure that high-producing areas have higher probabilities of being in the sample. Because the CSO framework does not include commercial producers (and we do not anticipate many of them), we propose to use target sampling to identify and include this producers group in our survey. We will also ensure that female producers are adequately represented in the samples.

Because the post-farm component of the supply chain is not as clearly identified, we propose to use target and reference sampling techniques to identify and survey/interview downstream supply chain participants. For example, for first handlers, we will ask producers to identify who their primary buyers are and use that information to track them. We will also use serial convenience sampling to collect information from first handlers, traders and retailers, asking respondents at each locus to identify their customers and their suppliers to ensure we have this informal segment of the industry covered.

Hotels, restaurants and institutions (military, police, schools, hospitals, etc.) are more organized. Therefore, we will sample them using stratified (provinces) cluster (industries) sampling. In each province included in our sampling frame, we would also use a walking tour interview approach to collect information from “market restaurateurs”—food purveyors who prepare and sell food in open markets—and retail traders in traditional open markets. We propose to use target sampling to identify and interview people in the processing and supermarket retail segments. We will also interview dry grain (non-pulses) processors to assess their perceptions about pulse processing.

The data and other information collected using the foregoing processes will provide input into addressing Objectives 1 through 4 under Category I. They will help us identify the factors influencing channel choice, industry concentration and accruing value by supply chain stage. These results will be inputs in the development of policies and strategies to enhance producer well-being and alleviate poverty and hunger.

Supporters’ Data Collection Approaches

We will use structured and semi-structured questionnaires to collect information from industry, government and NGO officials to address Objective 4 and generate guidance for Objective 5. The data collected will include: (i) government and NGO policies and programs supporting pulse value chains and their targets in the chain; (ii) effectiveness of these instruments; (iii) planned instruments for improving food and nutrition security and their development and/or implementation challenges; and (iv) perceived strength of links in the pulse value chains and their antecedents. We will particularly explore these officials’ views on solutions to identified challenges, focusing on specific human capacity development efforts.

4 Only districts contributing at least 1 percent to national product of crop is included in the sampling frame. See Tables 1 and 2 in Appendix 1 for a complete list of these districts.
Analytical Methods and Hypotheses Testing for Category I

Statistical methods will be used to provide an overview description of the data. These will be compared to secondary data for consistency. We will employ econometric models to test the following hypotheses associated with Category I objectives to enhance our understanding of the critical factors influencing performance:

1. **Hypothesis 1a**: Producers involved in shorter supply chains receive higher value from their exchange activities than those involved in longer supply chains.

2. **Hypothesis 1b**: Larger producers are more likely to be involved in shorter supply chains.

Transaction cost is influenced by the length of a supply chain (Sartorius and Kirsten, 2007) and size economies exist in the value chain (Koontz and Lawrence, 2010). These hypotheses help explain observed and estimated value in the different supply chains. If this hypothesis is not rejected, then it becomes important to explore innovative solutions to gaining size economies and reducing chain lengths through efficient chain organization.

3. **Hypothesis 2**: Bean and cowpea producers in Northern Province and Southern Province respectively receive higher total value.

Concentration and scale advantages in these large producing provinces would suggest that their producers gain benefits from lower transaction costs associated with better exchange infrastructure. Therefore, *cet. par.*, we expect them to receive higher total value than producers in smaller producing provinces.5

4. **Hypothesis 3**: Participants’ perceptions of policy and institutional effects differ across (a) regions; (b) genders; and (c) value chain loci.

The incidence of policies differs across regions because of differences in stakeholder characteristics. We argue that they also differ between genders and across the value chain because of how most policies are conceived and constructed. If we are unable to reject these hypotheses, then the effort at redefining policies must recognize their differentiating effects to be effective. In addition to the econometric tests, we will also conduct simulations using *iThink®* (a system dynamics (SD) modeling software) to evaluate the potential policy, size, chain length and other effects on producer performance. We will “test fly” these models with industry supporters (trade associations, government and NGO officials) to help them develop better appreciation of how these policy and institutional changes may influence producers’ performance. The participatory simulation process should increase understanding and ownership, thus improving chances that the “best” policies may be implemented.

Data Collection and Analytical Methods for Category II

Category II’s purpose is to improve producers’ value chain management skills through active participation. We pilot strategic alliances and contracts governance systems to evaluate producer performance against existing systems (controls). Strategic alliances require mutual recognition of need, shared responsibility for performance and equitable distribution of value, they present costs that may be unacceptable to some stakeholders (Amanor-Boadu and Martin, 1992). Contracts tend to be top down and present opportunities for moral hazard and shirking (Amanor-Boadu and Starbird, 2005) and may be unattractive to others. We will work with industry partners to identify 30 producers and select endpoint customers (wholesaler, processor, HRI, 5 We will also test this hypothesis at the districts level.
retailer) to participate in the experiments. Selected stakeholders will be trained prior to participating in both governance systems and we will employ stated choice experiments to assign them to their preferred governance system. They will receive education, advice and management support throughout the experiment to help them overcome challenges and/or seize opportunities. We will collect “hard” information—logistic costs, sales volumes, quality and prices, payment terms, and accruing value—and “soft” information—trust, confidence, and transaction costs related to search and negotiations, relationship maintenance, transparency and information sharing, loss of anonymity, etc.—on a monthly basis. Our intent is to track changes in knowledge and confidence and determine challenges and their antecedents to facilitate solutions. We will bring each value chain together for a “physical” meeting every quarter to discuss issues and challenges, identify solutions and share lessons at both the individual and group levels. We will use a case study approach to capture and evaluate the outcomes of the experiments, documenting influence factors for producer choice of governance system and performance. The case study will also capture individual and collective lessons from the experiments, the factors influencing these lessons (e.g., gender, chain stage) and an assessment of their impact. The lessons will inform effective managed value chain development and management processes given producer characteristics, which may be used in other industries and places.

**Collaboration with Host Country Institutions**

Dr. Gelson Tembo and Ms. Mukwiti Mwiinga of the University of Zambia are our host country PIs. They are both young Zambian scholars committed to agricultural economic development. Thus, we have an opportunity to initiate and sustain pulse industry research over a long period, and in so doing contribute to USAID’s global hunger and food security initiative.

Our HC PIs also bring the following organizations to collaborate on the project: (1) Zambia Agricultural Research Institute (ZARI); (2) ZNFU; (3) CGA; (4) MACO; (5) FEWSNET; (6) MSU Food Security Research Project (FSRP); and (7) the Agricultural Consultative Forum (ACF). We will work very closely with these and other institutions throughout the project, drawing on their local experience and knowledge about people, markets, and policies. We will also collaborate with Rebecca Lubinda and Prisilla Hamukwala, agribusiness development and value chain specialists in the Department of Agricultural Economics and Extension, UNZA.

Category I activities involve data collection, analyses, hypotheses testing and solution development. Both U.S. and HC PIs will work on data collection instruments and Dr. Amanor-Boadu will join Dr. Tembo in Zambia to train student participants in the research. Dr. Dalton and Ms Mwiinga will coordinate producer data collection while Drs. Amanor-Boadu, Tembo and Featherstone will coordinate data collection at all other stages in the chain. Data analyses and interpretation will be done by both U.S. and HC PIs, allowing for joint production of scholarly outputs, fostering closer collaboration for future work to support the project’s vision.

In Category II activities, researchers and their collaborators become participants in the learning process. It begins with governance systems training and continues with active interaction with participants on needs, challenges and opportunities. Drs. Amanor-Boadu and Tembo will work closely with USAID Mission, FEWSNET and MACO to identify end-user participants and with ZARI, ZNFU and CGA to identify and select producers. Drs. Tembo, Amanor-Boadu and

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6 One of the participation criteria in the pilot value chains is ownership of cell phones to facilitate data collection throughout the experiment.
Mahmud will organize and conduct the stated choice experiments to identify participants’ governance system preferences. They will also work on constructing the value chains to ensure effective performance using revealed preferences and other characteristics. Ms. Hamukwala and Ms. Lubinda will work closely with Drs. Tembo and Amanor-Boadu on supporting, advising, mediating and educating participants throughout the experiment. In addition to collecting data, our students will be included in all aspects of the experiments, providing them training in practical value chain research, development, implementation and management.

**Benchmarks**

The project’s success may be assessed on the achievement of its objectives to provide base knowledge about the industry and information about building effective value chains. Its outputs will include six undergraduate student research reports, three MS student theses, and three MAB theses. We count 12 graduates behind these scholarly outputs. We also anticipate no less than four faculty research publications, a number of departmental working papers, value chain enhancement policy paper, and an implementation process for developing and managing value chains. These outputs should contribute to the following outcomes: Knowledge about factors influencing supply chain choice and performance; Level, type and distribution of value created in pulse value chains; Knowledge about policy effects on value chain performance and augmentation opportunities; and improved producer skills for effective value chain management. Finally, we plan to conduct at least six short-term training programs for UNZA faculty and students and staff of collaborating organizations. These training programs will be technical—econometric techniques, system dynamic modeling, governance mechanisms, strategic management, systems thinking and implementing value chains. The expanded human capacity should bolster the industry’s support system and contribute to alleviating poverty and increasing food security throughout the agricultural sector.

Figure 2 shows that we will use the first quarter for preparations (solidifying our team, developing and testing questionnaires, training students, etc.) to collect data for Category I. Category I results will frame the development of the pilot value chains (Category II), which will begin by September 2011 and continue through to the end of the project timeline. Student theses and research reports as well as faculty research papers will commence about June 2011 and continue past the end of the project in December 2012.

**Figure 2: Timeline and Benchmarks**

Overall project management will reside with the lead PI. However, to work efficiently to achieve project objectives, Dr. Amanor-Boadu will work closely and collaboratively with all HC and U.S. PIs as well as leaders of collaborating organizations and partners. To ensure effective project management, he will maintain weekly contact with lead HC PIs.
HC Institutional Capacity Building

Sustainable Institutional Capacity Building Plan

To enhance and sustain the competitive ability of producers, UNZA needs to increase the number of graduates who understand value chain economics and management. Therefore, we will pursue the following efforts:

- **Recruit three** incoming (June 2010) MS UNZA agricultural economics students as graduate research assistants whose activities will focus on value chain economics and management. They will participate in all aspects of the projects—development of survey instruments, data collection and analyses, identifying solutions to producers’ value chain challenges, policy recommendations, and pilot value chain experiments. This learning and training approach is expected to provide them with a unique training program that prepares for applying scientific approaches to their post-graduation work in government, academia or business.

- **Recruit six** final-year undergraduate students as undergraduate research assistants to participate in data collection and analyses. We hope their passion for pulse research will be enhanced and they will be encouraged to pursue graduate studies or work in government or industry to support the industry.

- There is currently no consistent pulses economics and management research at UNZA or, to the best of our knowledge, at any Zambian university. This project initiates and builds such a research program, helping to spearhead innovative strategies for the industry and support natural scientists at UNZA, ZARI and other institutions in their efforts to introduce new technologies to producers and their value chains.

- K-State’s Masters in Agribusiness (MAB) ([www.mab.ksu.edu](http://www.mab.ksu.edu)) is a 30-month distance degree program that has trained about 300 students from 25 countries (including four in Africa) over the past 13 years. Its faculty includes international scholars from Uganda, Thailand, France, New Zealand, India, Uruguay and Russia. Its commitment to global education is reflected in its innovative *Comparative Food and Agriculture Systems* course, taught by eight professors from six continents. To be eligible for the MAB admission, students must have industry experience. Therefore, we will work with ZARI, ZNFU, CGA and other collaborators to identify and recruit **three** qualified individuals currently working in Zambia’s pulse industry to enroll in the January 2011 MAB cohort. Because of its distance format, MAB students do not lose time away from work and are able to implement their new knowledge immediately to enhance the performance of their organizations. These MAB students will participate in the project research and use the data for their theses.

- Plans are under way to appoint the lead U.S. PI as an adjunct professor in UNZA’s Agric Economics department. This should augment the department’s graduate student supervision and provide opportunities to team-teach some graduate courses using technology-mediated tools while intensifying research collaboration between the U.S. and HC PIs. This supports the development of a program platform for pulse research program extending beyond this project’s lifespan.

- Participants in the pilot value chain experiments receive support, education, mentorship and advice from researchers and their collaborators, helping develop and improve their decision-making.

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7 These students will be identified as soon as they report in June 2010 to begin their MS program.
8 While these students will not complete their degree requirements prior to the December 2012 end of this project, they will be close to finishing, working on their theses for May 2013 completion.
making and management skills to enhance performance. Because Zambian producers always plant more than pulses, the benefits from participating in the experiments are expected to be extended to other crops, creating opportunities to develop managed value chains in these industries and increasing the project’s impact on poverty alleviation because of its impact on increased producer incomes.

- By engaging our collaborators—ZARI, ZNFU, CGA, FEWSNET and MACO—in the research, we position ourselves to elevate knowledge about the economics and management of pulse value chains among policymakers and industry supporters. This should have the effect of increasing the attention that the pulse industry receives from these organizations, boosting the probability that our efforts will achieve their desired impact of increasing producer incomes through better-managed value chains.

**Innovative and Effective HR Development Strategy**

Our approach to HR development is the application of research-based contextualized solutions to identified problems for specific stakeholders. The solutions will be framed to recognize their stakeholders’ specific skills, capabilities and knowledge and the method of delivery will through mentorship, discussions, advice and team learning. These will occur formally on a quarterly basis after we initiate the value chain experiments. However, our monthly call-ins to the participants allow us to address issues arising before the quarterly meetings. Additionally, value chain participants may also contact the group at any time, giving them real time support.9

As common knowledge gaps among producers are identified, we will work with our collaborating organizations to develop appropriate channels to deliver solutions. For example, because most smallholder farmers listen to the radio even though they cannot read, we are currently investigating opportunities to develop relationships with local radio stations to carry value chain-related education content for producers as a public service program. We do not yet know how successful we will be in this endeavor, but we plan to explore all available options including seeking a sponsor to underwrite the program. We are also exploring specific opportunities that may be available at MACO’s extension service.

Our proposed long-term training programs cover the six 5th-year undergraduate students, three MS and three MAB students. They are innovative and cost effective because we leverage resources available in Zambia with support from K-State and reduce time away from work for the MAB training because of its distance delivery process. We will also reduce travel time and cost by leveraging K-State Online, our online communication technology and Skype to provide instruction and advising to UNZA students, and conduct meetings with HC PIs, collaborators and partners. These technologies also allow the team to rapidly transfer and share information, increasing the cost effectiveness of our project and information value.

Finally, we plan to document our research findings in multiple formats—written, video and audio presentations of the highlights. We also plan to record our quarterly meetings with participants in the experiments and produce them into learning and/or teaching content. These materials will all be made available to students, academics, industry professionals, government, NGOs and other interested parties on the project website (www.pvci-z.k-state.edu) so that they can contribute to performance enhancement in the pulse industry in Zambia and elsewhere as well as extend their applications to other agricultural industries and value chains.

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9 One graduate student will be designated the contact person for participants and would take and screen all incoming calls from them.
Strategy for Achieving Developmental Impacts

This project has been defined to have the following impacts: (1) reduced poverty by increasing incomes and reducing income variability; (2) enhanced HC institutional capacity; (3) stronger value chains through awareness and understanding of their value contribution to participants’ wellbeing; and (4) the sustainability of (1) (2) and (3).

Category I activities will provide, among other results, specific information on value accruing to producers given the supply chains they use, their location, gender, size and other characteristics. This will allow us to identify specifically the decisions and actions within producers’ control, which they may manipulate to increase incomes. The results will also allow us to identify the effects of government policies and other institutional factors on producer incomes given their characteristics—location, gender, size, etc. This will allow us to provide recommendations to governments and other institutional partners on how they may address adverse effects and amplify positive ones that contribute to income enhancement. By using system dynamic simulation models to explore alternative policy actions with our collaborators, we will be able to create shared mental models of potential effects of our recommendations, and provide metrics on their relative impacts on desired outcomes. Finally, the capacity building programs developed from the research results are expected to improve the decision-making capacity of producers and their value chain partners, helping them enhance their value creation potential.

Category II focuses our attention on strengthening value chains through specific attention to factors that produce strong value chains and minimizing the effects of factors that weaken them. The stated choice experiments to help stakeholders identify their preferred governance system will also teach them how to think through options and use economic outcomes to improve their decision-making. The lessons from the experiments will help make stakeholders become better value chain operators, improving their conflict management capacities and relationship management effectiveness. These improvements should lead to cost reductions and value improvements. The structure of our experiment allows us to influence the skills and capacity development of our participants throughout our engagement with them using real hands-on issues, problems and challenges. They learn trust-building, specification negotiations, and conflict management and build their confidence in dealing with each other through active participation in the experiment. As a result, they will become better managers.

We have planned to support and train three MS and six final year undergraduate students at UNZA, and three MAB students. The knowledge, research and analytical capacity enhancement these students receive through these formal programs would contribute to enhancing human resource capacity in Zambia. We anticipate some of the MS and undergraduate students entering the academy to teach and do research, and the MAB graduates becoming better managers. Our relationship with our UNZA colleagues is also expected to influence their research programs and increase scholarship through publications, engagement and teaching. We will also develop better appreciation of development issues, positioning us to do better and more impactful research in developing countries.

We define sustainability as the ability of producer incomes to continue growing and the continuous strengthening of their value chains as they learn to work more effectively with each other. We believe that the best approach to attaining this sustainability is to ensure that the producers and their partners are engaged in shared knowledge development so they take ownership of their own development even as they recognize where they can secure help when they need it. We are hoping that by engaging them in understanding the results from their own
data, and helping them to understand the effects of their situations on their incomes and income variability, they would take increasing levels of responsibility in making the necessary changes to secure the desired impacts. These impacts include enhanced incomes and reduced income variability, and recognition of their value chains as strategic resources for these impacts.

We will measure the impact of our efforts by benchmarking the initial value accruing to producers and others in their chains and then tracking this over time. Thus, we will develop a very simple value-tracking tool to help us do this. We propose that by providing producers and their partners with the information on the value they are creating on a regular basis, they would be motivated to manage towards progress.

**Host Country and Partner Selection Rationale**

Pulses remain a small percentage of Zambia’s agriculture. However, with increasing evidence of these crops potential to enhance food and nutrition security, especially because of increasing intensity and duration of droughts and floods in Zambia, it is important that the economics and management of their value chains is developed to help support industry stakeholder decisions as well as policymakers’ positions. However, there is currently no research in any Zambian institution on the economics and management of beans and cowpeas. Hence, very little is known about how much pecuniary and non-pecuniary value is created in Zambia’s value chain and how this value is distributed along the chain. Additionally, although there is evidence that a significant proportion of Zambia’s production is exported, there is no information about the type and characteristics of producers engaging in these regional trades and the channels they use. These gaps in knowledge about the economics of Zambian pulses industry provide the rationale for selecting it as a host country.

As Zambia’s premier university, UNZA has about 12,000 students in 11 schools, including agricultural sciences and veterinary medicine. Its School of Agricultural Sciences is relatively young, having commenced only in 1971 with five disciplines, including Agricultural Economics and Extension Education. The department’s faculty is also small, but it has expertise in gender issue analysis, marketing and smallholder agricultural economics, among others. Adding a pulse value chain research platform could be extremely beneficial to the university and to the country’s other research institutions.

Our partners, Dr. Tembo and Ms. Mwiinga, have both the knowledge and the passion to see this project succeed. They appreciate the importance of understanding the pulses industry structure, conduct and performance so that appropriate strategies and policies may be developed to help increase incomes and reduce income variability in the industry. Dr. Tembo and Ms. Mwiinga share our commitment to teaching and research, and to research-based education of industry players to help them apply research results in their business operations. Apart from their professional value to the project, they also bring a deep network resulting from their knowledge of Zambia’s agri-food sector. This allows them to provide us access to collaborate with ZNFU, CSO, MACO, ZARI, and CGA to increase our success potential.
Contribution to USAID Objectives and Initiatives

Contributions to USAID’s Policy Framework
The President’s Initiative to End Hunger in Africa (IEHA) is designed to help increase agricultural income and fulfill the UN’s Millennium Development Goal of cutting the number of hungry people in Africa in half by 2015. It focuses on promoting agricultural growth and building an African-led partnership to cut hunger and poverty by investing in agriculture oriented towards toward small-scale farmers.

This project creates partnerships among U.S. and Zambian scholars, pulse industry leaders and others working on the IEHA projects in Zambia to produce knowledge, improve human capacity and performance, and contributes towards USAID’s overarching objectives of alleviating poverty and reducing hunger risks. We have noted that this research project provides information on factors that influence performance in beans and cowpea value chains. Nevertheless, there is little or no specialization in Zambian value chains: producers do not produce single crops, traders frequently purchase more than a single commodity just as retailers and restaurants procure and use multiple commodity inputs. Therefore, this project’s contribution to performance through knowledge development and alternative value chain organization and optimization is bound to be felt beyond the bean and cowpea industry. Thus, despite our focus on working closely with the pulse industry and driving knowledge and change using the results of the research described above, we believe our effort supports the IEHA and the new Global Hunger and Food Security Initiative. This is because all participants in our project—from producers to retailers, collaborators to policymakers—also work in a broader agricultural industry context and the knowledge they gain through this research effort will be applied in other industries.

By maintaining cognizance of other initiatives and activities by USAID projects in the country and the region (PROFIT, FEWSNET, MSU Food Security Project, etc.), we avoid duplication and leverage knowledge and resources to increase our return on effort and investment. By seeking and securing the collaboration of industry associations, government agencies and NGOs working with farmers and the food sector, we again leverage resources and enhance our contribution to USAID’s global objectives.

Strategy for Integration of Gender Equity
Bean and cowpea production in Africa is predominantly a woman’s industry (Wortmann and Allen, 1994). Preliminary analysis of CSO data (2008) shows that this is not the case in Zambia: There was neither no statistical difference between female and male producers in their area harvested nor total production. This means we cannot merely adopt observations from other places and apply them in Zambia. Thus, we have gender as a control variable in this research; looking at how women producers, traders, etc. perform their business given their locations, operation size, and the channels they use. The research, therefore, provides detailed information on how to reorganize value chains and alter policies and support programs to ensure that there is gender equity in Zambia’s beans and cowpeas industry.

In selecting students for training, we maintain our focus on gender equity. Thus, to the best of our ability and availability, we will bring at least three female undergraduates into the program and at least two female MS and one female MAB students. We will also maintain cognizance of gender equity when recruiting collaborators to support our project. While most institutional
leadership is gender biased, we will work hard at ensuring gender equity without sacrificing the effectiveness of our efforts.

**Mission Engagement and Partnership Plan**

Our HC PIs have initiated communication with USAID/Zambia mission to solicit and secure their support for this project. If we are successful in our proposal, we will immediately connect with the EGAT team leader and work closely with the leader’s office to identify how we may benefit from resources and initiatives already on the ground in Zambia and in the region.

We have already secured collaboration from some of the USAID-funded initiatives in Zambia—FEWSNET and MSU FSRP— and intend to connect with PROFIT and others as soon as possible. We will work with each of these groups on clearly defined partnership structures, identifying the contributions of our efforts to their objectives and seeking their contributions to our objectives so we can discover the points of synergy and opportunities for collaboration.

We will specifically work hard to include the USAID Zambia Mission staff in our strategic planning activities at the beginning of the project so that we can ensure that we have a shared mental model about the project with the mission staff. We will also endeavor to visit with and brief the leadership at USAID Mission on our progress intermittently, and actively seek their guidance and advice on how resources may be leveraged to increase impact and reduce duplication of effort in Zambia and the region.

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10 Both Dr. Tembo and Ms. Mwiinga have worked at the MSU FRSP.
REFERENCES


Food and Agriculture Organization.  FAOStats (www.faostats.org).


"Against all odds : Explaining the exporting success of the danish pork co-operatives / jill E. hobbs."


Appendix 1: Sampling frame for Producer Survey

Table 1: Distribution of Zambia’s Bean Production and Producers by Top-Producing Districts (2006/07 Agricultural Season)

<table>
<thead>
<tr>
<th>District</th>
<th>Production</th>
<th></th>
<th>Producers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metric tons</td>
<td>% of National</td>
<td>Number of</td>
<td>% of National</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production</td>
<td>Producers</td>
<td>Total</td>
</tr>
<tr>
<td><strong>Northern Province</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mbala</td>
<td>8,442</td>
<td>24.2%</td>
<td>22,949</td>
<td>12.6%</td>
</tr>
<tr>
<td>Mpulungu</td>
<td>4,817</td>
<td>13.8%</td>
<td>11,563</td>
<td>6.4%</td>
</tr>
<tr>
<td>Kasama</td>
<td>3,451</td>
<td>9.9%</td>
<td>12,207</td>
<td>6.7%</td>
</tr>
<tr>
<td>Mporokoso</td>
<td>2,658</td>
<td>7.6%</td>
<td>11,718</td>
<td>6.5%</td>
</tr>
<tr>
<td>Luwingu</td>
<td>1,398</td>
<td>4.0%</td>
<td>6,342</td>
<td>3.5%</td>
</tr>
<tr>
<td>Mungwi</td>
<td>1,358</td>
<td>3.9%</td>
<td>7,081</td>
<td>3.9%</td>
</tr>
<tr>
<td>Nakonde</td>
<td>1,044</td>
<td>3.0%</td>
<td>8,535</td>
<td>4.7%</td>
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<tr>
<td>Chinsali</td>
<td>794</td>
<td>2.3%</td>
<td>9,148</td>
<td>5.0%</td>
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<tr>
<td>Mpika</td>
<td>776</td>
<td>2.2%</td>
<td>8,453</td>
<td>4.7%</td>
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<tr>
<td>Isoka</td>
<td>655</td>
<td>1.9%</td>
<td>6,279</td>
<td>3.5%</td>
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<tr>
<td><strong>North-Western Province</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mwinilunga</td>
<td>1,018</td>
<td>2.9%</td>
<td>7,654</td>
<td>4.2%</td>
</tr>
<tr>
<td>Solwezi</td>
<td>666</td>
<td>1.9%</td>
<td>6,664</td>
<td>3.7%</td>
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<tr>
<td><strong>Central Province</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serenje</td>
<td>1,689</td>
<td>4.8%</td>
<td>8,856</td>
<td>4.9%</td>
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<td>Kapiri Mposhi</td>
<td>1,150</td>
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<td>4,009</td>
<td>2.2%</td>
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<tr>
<td><strong>Luapula Province</strong></td>
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<tr>
<td>Mansa</td>
<td>1,011</td>
<td>2.9%</td>
<td>6,737</td>
<td>3.7%</td>
</tr>
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<td>Kawambwa</td>
<td>595</td>
<td>1.7%</td>
<td>3,568</td>
<td>2.0%</td>
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<tr>
<td><strong>National totals</strong></td>
<td>34,853</td>
<td>90.30%</td>
<td>181,456</td>
<td>78.20%</td>
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</table>
Table 2: Distribution of Zambia’s Cowpea Production and Producers by Top-Producing Districts (2006/07 Agricultural Season)

<table>
<thead>
<tr>
<th>District</th>
<th>Production</th>
<th>Producers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Metric tons</td>
<td>% of national production</td>
<td>Numbers</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Central Province</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chibombo</td>
<td>472</td>
<td>11.3%</td>
<td>3,894</td>
</tr>
<tr>
<td>Kapiri Mposhi</td>
<td>320</td>
<td>7.7%</td>
<td>1,342</td>
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<tr>
<td>Mumbwa</td>
<td>272</td>
<td>6.5%</td>
<td>1,034</td>
</tr>
<tr>
<td><strong>Eastern Province</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mambwe</td>
<td>68</td>
<td>1.6%</td>
<td>757</td>
</tr>
<tr>
<td>Lundazi</td>
<td>40</td>
<td>1.0%</td>
<td>452</td>
</tr>
<tr>
<td><strong>Lusaka Province</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chongwe</td>
<td>144</td>
<td>3.5%</td>
<td>960</td>
</tr>
<tr>
<td><strong>Northern Province</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mporokoso</td>
<td>105</td>
<td>2.5%</td>
<td>1,000</td>
</tr>
<tr>
<td>Mbala</td>
<td>51</td>
<td>1.2%</td>
<td>107</td>
</tr>
<tr>
<td><strong>North-Western Province</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kabompo</td>
<td>134</td>
<td>3.2%</td>
<td>1,652</td>
</tr>
<tr>
<td><strong>Southern Province</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Kalomo</td>
<td>403</td>
<td>9.7%</td>
<td>4,723</td>
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<tr>
<td>Mazabuka</td>
<td>361</td>
<td>8.7%</td>
<td>2,684</td>
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<tr>
<td>Monze</td>
<td>348</td>
<td>8.3%</td>
<td>4,098</td>
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<tr>
<td>Saivonga</td>
<td>209</td>
<td>5.0%</td>
<td>1,046</td>
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<tr>
<td>Kazungula</td>
<td>156</td>
<td>3.8%</td>
<td>2,761</td>
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<tr>
<td>Choma</td>
<td>117</td>
<td>2.8%</td>
<td>2,427</td>
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<tr>
<td>Sinazongwe</td>
<td>113</td>
<td>2.7%</td>
<td>2,012</td>
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<tr>
<td><strong>Western Province</strong></td>
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<tr>
<td>Sesseke</td>
<td>367</td>
<td>8.8%</td>
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<tr>
<td>Senanga</td>
<td>89</td>
<td>2.1%</td>
<td>463</td>
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<tr>
<td>Lukulu</td>
<td>79</td>
<td>1.9%</td>
<td>348</td>
</tr>
<tr>
<td>Shangombo</td>
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<td>1.6%</td>
<td>629</td>
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<tr>
<td><strong>National totals</strong></td>
<td>4,164</td>
<td>93.90%</td>
<td>44,113</td>
</tr>
</tbody>
</table>
Annexes

Curricula vitae
Letters of support
Conversations with the Director of Pulse CRSP have led to the following clarifications and amendments to the technical proposal for the project.

It is reiterated that there is very little knowledge about bean and cowpea markets in Zambia, especially information about quantities and channels associated with regional trade. Yet, there is evidence that Zambia's pulse industry plays a strategic role in the regional market. The proposal defines a process to track product flows along the value chain to determine their destinations, domestic and international. The proposed approach is soliciting buyers’ information from sellers, and tracking those buyers for interviews. It is recognized that this activity may require the research team to travel to neighboring countries to interview users, traders and buyers.

For the purposes of clarification, the specific outputs from the data collection process defined in the proposal with respect to regional trade and Zambia's strategic role are:

1. Estimates of the quantity of beans and cowpeas flowing from Zambia into neighboring countries and any flows into Zambia from neighboring countries.
2. Identification of points along the supply chain where regional trade occurs and estimates of flow quantities and proportion of participating stakeholders in these activities.
3. Factors and motivations for such flows. E.g., price arbitrage advantages, market proximity, ease of market access, buyer services (such as financing, aggregation, and credit), etc.
4. Estimates of value associated with regional trade products. This value will be compared with value generated in the domestic market at similar loci in the supply chain.

The foregoing will contribute to the design of policies and provide support for interventions that enhance producer incomes while illuminating the infrastructural gaps that need attention.

The technical proposal’s Category II activities are important in helping shape appropriate and sustainable intervention programs and policies to enhance producer incomes. It is recognized that piloting governance systems may be ambitious, given the project's time constraints. Yet, the data and information garnered from this effort will be crucial in developing long-term education and skills advancement programs to improve producers’ ability to participate effectively in value chains. Knowledge-based and skills-driven participation is fundamental to building sustainable solutions to the persistent smallholder farmer’s income and food security problem. To this end, the potential benefits from the experiment are deemed to exceed the risks associated with its ambitiousness. Maintaining cognizance of these risks, however, will inform their management through careful attention to the experiment’s design.

This research provides the foundation for developing a viable and sustainable value proposition for pulse industry stakeholders, especially smallholder producers. Future research would utilize this information, and in conjunction with improved understanding of consumer behavior towards pulses, craft strategies aimed at enhancing the role of beans and cowpeas in nutrition security vis-à-vis traditional staple foods. This should enhance the industry’s competitiveness and provide an economic rationale for its expansion, contributing to USAID’s program objective of alleviating poverty and reducing hunger.
RESPONSES TO DR. BAHIRU DuGUMA’S EMAIL DATED JUNE 24, 2010 WITH SUBJECT: KSU PROPOSAL

By

Vincent Amanor-Boadu, Lead PI, Kansas State University
and
Gelson Tembo, Lead PI, University of Zambia (Host Country Institution)

A. Regional scope of the study

Preliminary research indicated that there was already work being done in Mozambique, Tanzania and Angola. However, there was little or no information on the value chain structure, conduct and performance in Zambia. This gap in the southern African pulse economic and market information systems for pulses informed the scope of the research proposal. Let us elaborate the rationale and the processes that underscore our ability to provide regional information to program managers, policy makers and supply chain participants in the following bullets.

1. While we understand collaboration in multiple countries and within a region is encouraged under this project, we were cognizant of the research time constraint and the need to focus on developing and testing this novel methodological approach for value estimation in value chains. We believe that doing it right positions this approach for application across the region in future value chain activities. Thus, the focus was to define a country and use the “Follow the Product” data collection approach to capture the relevant value chain impact information, identify the challenges associated with the approach and develop solutions for them prior to applying it on a regional scope.

2. Description of the “Follow the Product” Model of Data Collection.
   a. There is virtually no information on value created and its distribution in the Zambian pulse industry. However, preliminary conversations with organizations, such as FEWSNET, indicated that regional trade in beans and cowpeas is occurring. Nevertheless, there is no knowledge about the factors that are influencing these transactions beyond those that may be attributable to economic and behavioral theories. Emerging research in behavioral economics suggests that these theoretical expectations cannot be assumed if research is expected to influence such important questions as poverty alleviation and food and nutrition security.¹
   b. The data collection process defined for this study under Category I of the technical proposal may be described as the “Follow the product” model. It involves beginning with producers and identifying, among other things, where they sell their beans and cowpeas and to whom. Then at each stage in the supply chain, we find out from where

¹ See Steven Landsburg’s The Big Question: Tackling the Problems of Philosophy with Ideas from Mathematics, Economics and Physics (Free Press, 2009) and Ori Brafman and Rom Brafman’s SWAY: The Irresistible Pull of Irrational Behavior (Doubleday, 2009) for varied discussions of these challenges to theories and their assumptions.
and whom products are purchased and to whom and where products are sold. This approach is supported by the target and reference sampling techniques we defined on Page 5 of the Technical Proposal. This method allows product flow through the supply chain to be tracked, from beginning to the end for each sampled producer in the survey. It is possible that some of these references (buyers/sellers) in the supply chain will be from neighboring countries. The defined approach allows us to track them and interview them, collecting information on where they purchase their products (not only the Zambian ones) and where they sell them. Therefore, it is implicit in the data collection method defined for the project that our efforts may expand outside Zambia given the product flow in the supply chain. It is also implied that downstream buyers may identify significant suppliers that were not included in our sample that need to be interviewed. The “Follow the Product” Model is illustrated in the attached figure.

c. Built into the “Follow the Product” approach is an iterative process to find out from buyers where they purchased their product and interviewing those sources to get a fuller picture of the product flow. Thus, a buyer may indicate purchasing products from sellers in Zambia and Mozambique. We intend to collect the relevant information about these sellers and track them.

d. The data collection process defined for the study allows us to identify the points in the supply chain where products leave or enter the country, how much product is involved and what types of products are involved. The process allows us to estimate the proportion of total product handled at each level in the supply chain that enters regional trade transactions. The process also allows us to measure the value associated with the different transactions through the supply chain, including regional trade transactions. We also capture the factors influencing these product flow patterns, including regional trade flows, and identify ones that can be effectively included in operational strategies to enhance incomes and alleviate poverty.

e. Therefore, while the research focuses on Zambia’s pulse industry, the “Follow the Product” model allows us to not only identify how much of Zambian as well as neighboring countries’ beans and cowpeas are entering regional trade transactions and why such transactions occur, we are able to gain insights into where in the supply chain these transactions take place and the perceived and realized pecuniary and non-pecuniary values that support them.

3. The results from this very detailed approach may be linked to current CRSP studies occurring in neighboring countries to facilitate the development of a broader regional activity. The approach
allows this project to maintain its focus on collecting detailed information about the types of supply chains Zambian bean and cowpea industry stakeholders participate in and where in the chain and how much value they extract from the different chains. It also avoids the risk of duplication with other research efforts in the region, allowing us to bring our in-depth Zambia results to work with other CRSP researchers at some point on meta-analysis of the results from other countries.

4. We are confident that this approach offers not only the results of the research but advances and tests a methodological approach to value chain research that allows products to be tracked, their value contributions estimated and the factors defining the choices, activities and decisions of supply chain stakeholders at each stage identified and the effects of these choices, activities and decisions on value creation and extraction explained. We believe this methodological approach is novel and will prove to be extremely useful in program and policy development and implementation across the region after it has been tested and refined for Zambia.

B. Commercial value chain analysis focus: The “Follow the Product” approach ensures that the risk of missing in-home consumption is avoided. Recall that Objective 3 of Category I seeks to describe and estimate the pecuniary and non-pecuniary value accruing to different supply chain participants. This allows us to capture and put value on the proportion of beans and cowpeas that are consumed at home, given away as gifts, or otherwise not traded in the traditional transactions at each stage of the supply chain. We believe that most studies ignore these important components of the uses of production because they are not monetized. It is precisely to overcome this underestimation of value creation that we adopted the “Follow the Product” approach and categorically stated that we will measure both pecuniary and non-pecuniary value along the chain.

C. Productivity: Our analysis of historical data showed that bean and cowpea yield per hectare has been virtually static over the last decade. The problem may be a result of numerous issues, including the use of inappropriate seed technologies or husbandry approaches. We do not address this problem because we see developing a good understanding of sources and level of value as critical to on farm productivity solutions. Seeds, fertilizers and pesticides are not free. However, if producers can envision opportunities for increasing the value accruing to them because of effective communication in their supply chains, they could make the requisite investments. Indeed, the issue of capital constraints becomes moot under such conditions because the supply chain could collaborate to overcome the constraint through contracts and other enforceable governance systems. This is the rationale behind the activities described under Category II: identifying the effect of governance systems on value creation and capture. If there is no value to be captured, then increasing productivity only exacerbates the value situation confronting producers. Therefore, we see identifying the value at each stage of the supply chain as critical to crafting effective strategies to address productivity improvements.

D. Non-monetary value of pulses: The observation is that non-monetary value of pulses is not fully recognized in this study. On the contrary, it a critical activity of this proposal to address the incomplete accounting of value in agri-food supply chains in Africa because of the significant
proportion of non-traded components. We address this categorically in Objective 3 under Category I. Indeed, we even attempt to capture the value from pulses to producers even before dry products are harvested. See footnote 2 on Page 3 of Technical Proposal. Indeed, our defined approach will allow us to have a comprehensive estimate of value at each stage of the supply chain.

E. Pulses are not a women’s crop in Zambia: We note on Page 13 of the Technical Proposal that Wortman and Allen (1994) had defined bean and cowpea production in Africa as predominantly a woman’s industry. However, using the Zambia’s Central Statistical Office (2008) data, we could not support this observation statistically. The data showed that of the 1,143 respondents identified by gender, 50.4 percent were male and 49.6 percent were female.

a. It is instructive to look at data from previous surveys to determine the stability or trend on the proportion of females in the CSO data. However, to ensure gender equity, we wish to modify the sampling approach in our proposal specifically to include stratification based on gender within each standard enumeration area (SEA) with the view to include no less than the CSO estimated proportion of females in our sample in each SEA. This approach will ensure that there is at least 50 percent female representation over the whole sample (based on the 2008 CSO survey). By including gender as a stratification variable (in addition to province and district), we ensure that gender equity idiosyncrasies are explicitly addressed in our project.

F. Lessons from another industry. This is a very important suggestion and is very much appreciated because it will provide a context for the value measures for pulses. To this end, we explicitly include maize in our study as context crop. Maize’s selection is based on it being planted by almost every household in Zambia, and, is therefore, in a position to provide lessons of value creation and extraction along the supply chain for pulses. That it is planted by almost all households implies that pulse growers included in the study will most likely also be maize growers, facilitating direct comparison of pulses with maize. Additionally, we will track and measure value creation and extraction along the full supply following the “Follow the Product” model described above. The results will be very instructive for all and possibly provide explanations to current situation in the pulse industry or challenge assumptions driving behavior towards pulses.

G. Aligning project with the Feed the Future objectives. Category II is specifically designed to work with producers and their supply chain partners to improve supply chain efficiency and improve value creation and extraction through modification of strategies. Our efforts in this segment of the proposal involve knowledge development and learning through active participation and engagement among participants. Our aim is to help participants understand the operations costs in their supply chain transactions and help them develop initiatives to reduce these costs in ways that contribute to value creation and extraction. We also aim to help them identify sources of new value creation, which could include adoption of new varieties and new production techniques, the use of fertilizers and pesticides to enhance productivity. We intend to work with the players to develop protocols to
embark on shared investments to facilitate the creation of new value, thereby overcoming potential farm-level capital constraints that may prevent the supply chain from benefiting from the productivity improvement opportunities. Thus, Category II activities are designed to facilitate engagement with the stakeholders in ways that support improvements in income, food security and nutrition. We will particularly focus on the income, food and nutrition security enhancements for producers. The value measurement system we have defined also allows us to capture the monetary and non-monetary benefits and costs emanating from the relationships and its activities. The system we have proposed under Category II also allows us to work with the participating stakeholders to ensure that their individual benefit-cost ratio exceeds unity and the ex post value received under these arrangements exceed the benchmark value established prior to the pilot activities.

H. We agree that reviewer’s comments have merit and should be taken seriously. We addressed the nine points we received from the Management Office under its own cover [RESPONSES TO REVIEWER #1]. We hope that we have succeeded in clarifying our proposal and wish to table this response and the relevant segments of our responses to the reviewer as an amendment to our original technical proposal.

Thank you.

Sincerely,

Vincent Amanor-Boadu and Gelson Tembo
The research team acknowledges with gratitude the points raised by the reviewer. We address the nine points we received in order.

1. We agree with the reviewer that we did not pack the proposal with literature citations. There are a number of reasons for this.
   a. We wanted to respect the eight-page limit the RFP placed on the proposal and assumed that certain aspects of the problem, especially those reflected in the RFP itself could be taken as given and revealed knowledge. This occurs in the early section of the proposal where we were only paraphrasing the justification for the project as defined in the RFP.
   b. In the substantive component of the proposal, where we were presenting our ideas to address the problem, we believe we provided the requisite support from the literature. For example, we indicated in the introduction to our project objectives (Page 2) that we would be applying strategic management and industrial organization constructs in addressing the defined problem. We referenced the leading literature on those frameworks, believing that anyone knowledgeable about the framework would appreciate that and those who are not would find both Dees and Lumpkin’s work on strategic management and Scherer and Ross’s work on industrial organization both broad and deep expositions to the frameworks.
   c. We did not provide any references under data collection methods because we assumed these methods are tested and would be irrelevant in a proposal at this level.
   d. Under analytical methods, we provided references on the issues that we deemed necessary and not commonly recognized among practitioners for the tools we sought to employ.
   e. That the research team is aware and knowledgeable of the literature in the field and tools they have chosen to employ to address the problem may be confirmed in their vitae, which were appended to the proposal.

2. Figure 1 is standard product flow channel diagram that has no political context around it. Regardless of where a product is produced and by whom, it reaches its ultimate consumer through one of these channels. A similar model was presented for the cowpea market in West Africa by Mishili et al. (2009) in a project funded by the Pulse CRSP.¹
   a. By beginning with the producer, we get total production, deduct home consumption and other non-market uses and continue through the channels to capture quantities flowing through them. We indicate in Footnote 2 (Page 3) our cognizance of the unique role of beans and cowpeas in pre-harvest household income and food by indicating our intent to capture green pod and leaves consumption and sales. To the best of our knowledge, this part of the value contribution from these crops has been overlooked by the research community and this attempt to capture it as part of the value contribution of the crops is indicative of our understanding and respect for the

operations of smallholder producers in Zambia (or anywhere) and their supply chain partners.

3. The pilot initiative is aimed at meeting the project requirement of not only providing training and conducting research, but providing useable tools that participants may use to improve their lot. It aims to improve participants’ value chain management skills through active participation. It, therefore, provides real time information to facilitate identification of and the development of solutions to gaps in participants’ skills. By the exploratory nature of the process, it was necessary to be willing to be open to the discovery behavioral factors and constructs that could explain performance that have hitherto not been observed. The explorative approach to this component of the project requires a willingness to be flexible and to improvise when appropriate. Our objective is to work with specific stakeholders to pilot two governance systems and use the in tempo lessons and information to develop programs to improve performance and wellbeing.

a. We apologize if the process to conduct the pilot initiative is unclear. We indicated that we would work with our industry partners to identify the participants. We indicated 30 producers. We also indicated that we would build the initiative around specific market needs of an endpoint customer. We would assign producers to specific governance systems based on their revealed preferences in a stated choice experiment that would be conducted (Page 7). We would allow the prevailing market conditions to define the number of downstream partners that are selected. Participants’ situations—realized value (pecuniary and non-pecuniary), volumes traded, payment terms, delivery/receiving conditions, logistics costs (pecuniary and non-pecuniary), trust, etc.—will be captured and used as a benchmark to track participation effects associated with the structured governance mechanism on a monthly basis.

b. We erred in assuming the obviousness of the collection and tracking of the foregoing information through structured interviews. Indeed, we noted that ownership of a cell phone is a prerequisite for participation to facilitate the collection of the identified data.

c. We also noted that we would hold physical meetings with the participants on a quarterly basis to facilitate conversations and engender learning opportunities among the participants.

d. We finally indicated that we would use the case study approach to capture and analyze the outcomes of the pilot initiatives, and that these lessons will inform value chain management strategies using the variables that emerge as important in the study.

e. If we are missing something, we will be happy to address it. In our humble opinion, the approach to conducting the pilot activities was clearly described.

4. We thought we had a clear and concise data collection process mapped out. We note collecting data from the trade, defined to encompass producers and downstream supply chain stakeholders. We indicated using the Zambian Central Statistical Office survey of 2008 to guide our sampling process, which we indicated would be based on CSO’s standard enumeration areas and the households in those areas. This is, thus, a two-stage stratified cluster sampling approach. We noted that only districts providing at least 1 percent of national bean and cowpea production would be included in the sampling frame. See Footnote 4 on Page 5.
a. There is no way of getting a population for the downstream stakeholders in the industry. Besides, given that our modus operandi is to track production by each sampled producer respondents through the supply chain, the approach of reference and target sampling was deemed the most appropriate. The approach is simple, practical and purposeful: We ask the producer who purchased their products and we go and interview those buyers, asking them where they sold the product to, and going to interview the next level of buyers, and so on until we reach the end of the chain. We illustrate the process in the figure above. The approach also allows us to identify from buyers from where else they purchased products and how much, allowing to step-back to include significant suppliers (e.g., regional suppliers) into our data, and hence our analyses.

b. We have already discussed the approach for data collection for Category II (under 3. above).

5. Shorter supply chains have very few stakeholders between origination and endpoint users. Figure 1 in the Technical Proposal shows the supply chains getting shorter as we move to the right in the figure. We apologize for assuming that this was clear to the reader.

a. On Page 1, we note that beans are concentrated in the Northern Province while cowpeas are concentrated in the Southern Province. Hypothesis 2 is designed to test the effect of production concentration on value. We do acknowledge that it is specified awkwardly, a result of our attempt to keep to the eight-page limit, and apologize. We may specify them as follows:

\[ H_o : v_{bi} = v_{bj} \quad \forall i \neq N \]
\[ H_1 : v_{bn} > v_{bi} \quad \forall i \neq N \]
\[ H_o : v_{ci} = v_{cj} \quad \forall i \neq S \]
\[ H_1 : v_{cs} > v_{ci} \quad \forall i \neq S \]

where value realized by producers in a particular province is defined as \( v_{ji} \), where the subscripts \( i \) refers to the province where the producer produces the product \( j = b \) or \( c \) for beans and cowpeas respectively.

b. We have three hypotheses subsumed into Hypothesis 3 for the same reason. We clarify these as follows. Objective 4 under Category I activities focuses on identifying the institutional and policy issues influencing value creation. These encompass production subsidies, government procurement programs, extension support, and others at the production level and regulations, taxes and other institutional factors across the supply chain. The impact of these variables on value
accruing at each stage in the supply chain will be estimated using econometric methods and their coefficients used in the hypotheses testing. Defining value as \( v_j \) for \( j = b, c \), where \( b \) and \( c \) are beans and cowpeas respectively, we estimate an econometric model for each crop to determine the contribution of the regions, the value chain loci and gender using dummy and the effect of policy perceptions using a Likert-scale metric. We include interactions between the policy perception and the demographic variables and test significance of the estimates of those interactions. For clarification, assume the specific model is as follows:

\[
v_j = \beta_0 + \sum_{i=1}^k \beta_{ip} x_{ji} + \sum_{i=1}^k \gamma_{ip} y_{ji} + \epsilon_j
\]

where \( x_i \) defines the demographic, policy perception and other variables of interest in the value determination function and \( y_i \) defines the interaction between policy perception variables and the demographic variables of interest (gender, location, and stage in the value chain). \( \beta_{ip} \) and \( \gamma_{ip} \) represent the regression estimates. Hypothesis 3 is restated in full, thus, as follows:

\[
H_0 : \gamma_{jp} = 0; \quad H_1 : \gamma_{jp} \neq 0 \Rightarrow Gender \text{ for all policies, } p
\]

\[
H_0 : \gamma_{ip} = \gamma_{kp}; \quad H_1 : \gamma_{ip} \neq \gamma_{kp} \Rightarrow Region/Locus \text{ for } i \neq k, \text{ for all policies, } p
\]

where subscript \( i \) and \( k \) refer to the different regions and the policy perception variables are indicated by subscript \( p \) while the crops are represented by the subscript \( j \).

6. A detailed Gantt Chart is present at the end of this report.

7. The issue about proposed econometric techniques was assumed apparent given the problem defined in the proposal. We hope that the clarifications presented above illustrate our command of the tools we intend to employ to achieve the defined project objectives.

8. Yes, the claim to help participants “learn trust-building, specification negotiations, and conflict management and build their confidence in dealing with each other through active participation in the experiment” is exactly one of the impacts we want to achieve. We deemed this an important component of the expectations defined in the RFP. It fits in the expectations that innovative and cost effective training for developing human resources and building capacity will pursued. We defined human resources to encompass producers and their downstream supply chain partners as well as students involved in training. Effective participation in supply chains to create value is a challenge confronting most agri-food industry stakeholders. The activities described here, which we hope have been clarified under Item 3 above, provide research output into what determines success in supply chains and facilitates working directly with select industry participants to implement the discoveries immediately. The approach of engaging the participants in the identification of the challenges and developing solutions positions this project to influence performance in other industries beyond pulses because most of these participants are likely also producing, selling and buying other crops and products as well. Thus, the lessons and skills developed in this segment are expected to influence overall value creation and extraction among producers and contribute directly to poverty alleviation almost immediately.

9. The preliminary data on women participation ratios (CSO, 2008) indicated that females accounted for about 50 percent of producers of beans and cowpeas in Zambia. This,
unfortunately, swayed us to believe that a stratified cluster sampling approach based on location and household will capture gender equity. Despite this, we had indicated in all the tests and analyses that we would assess the role of gender. Thus, we were not trivializing the issue at all.

a. To make our commitment to gender equity clear unequivocally, we propose a modification of our sampling approach to involve a stratified cluster sampling approach that is based on (i) location; (ii) gender; and (iii) households at the producer level. We will use this approach to draw samples at all other levels in the supply chain as we move down the chain collecting data. In selecting participants in the Category II initiatives, we will again ensure that gender distribution is based on the distribution we get in our research at all levels of the supply chain.

b. In the analyses of Category I data, we commit to looking at all the issues through a gender lens. That is, we will include a gender dummy variable in all the econometric analyses to assess the impact of gender on our results. For example, under Objective 2 of Category I, we will be particularly vigilant about the role of gender in the choice of particular supply chains and assess the factors influencing this if any differences are observed. This would illuminate gender-based access constraints that may need to be addressed to eliminate or at least reduce gender-based bias in poverty and food security. We have already indicated that we are conducting gender-based tests under all the hypotheses we are testing.

c. The analyses of issues under Category II using case studies will also isolate the gender variable to determine if a gender-based training and gender-sensitive supply chain structures need to be developed to ensure participation effectiveness.