Improving Trading Relationships through Intermediation and Liquidity Access:

Experimental Design of the IE for the Zambia Agribusiness and Trade Project

Concept Note

Application for Implementation Funding

Competitiveness Policy Evaluation Lab - ComPEL

Abstract

Integrating an impact evaluation into the Zambia Agribusiness and Trade Project(P156492), this study will assess the role of technical support and financing on the emergence and sustainability of trading relationships in agriculture. The interventions target two points of the value chain for agricultural outputs: that of farmer groups with buyers and that of small agribusinesses with their buyers. Consequently, in practice, this proposal is putting forward two separate, but related impact evaluations – one based on farmer groups and the other on agribusiness SMEs. In both settings, the evaluations will seek to (a) identify the market frictions that prevent the formation of productive trading relationships between buyers and sellers/producers, and (b) test approaches to targeting these frictions to improve contracting and welfare for both parties. Using a Randomized Control Trial, the impact evaluations aim to contribute rigorous evidence to a literature-base that is relatively underserved, and understand the effect of releasing coordination frictions and liquidity constraints in the creation of productivity-enhancing relationships.

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1. Background

With a fast-growing population of 16 million and a per capita income of US$ 1721 (Report No: PAD1880), Zambia has made large socio-economic strides over the last two decades. The agricultural sector has been a crucial part of this rapid growth, providing employment to over half the labor force (World Bank, 2012). Despite its outsized role in employment, the agriculture sector's value addition to GDP is just 5.25% (WDI, 2015). There are several potential hypotheses for why this might be, including low agricultural productivity, uncertain producer access to markets or liquidity constraints, and a slew of other issues that are common across Sub-Saharan African countries. Furthermore, despite growing macroeconomic stability, the country is still heavily dependent on natural resources, copper being the primary export product. Even though mining accounts for 77% of total exports, it employs just 1.7% of the total labor force (Report No: PAD 1880). Advancing the agricultural sector, which covers a substantial share of the labor force to more comparable levels of productivity, is of crucial importance for sustained and balanced economic growth. The Zambia Agribusiness and Trade Project (ZATP), aims to make investments at critical points in the agribusiness sector to help relax constraints related to information asymmetries, coordination and capital market inefficiency. As the Project Appraisal Document states: "the development objective of the proposed project is to contribute to increased market linkages and firm growth in agribusiness." (Report No: PAD1880)

The proposed Impact Evaluation (IE) will evaluate issues that are at the heart of ZATP (P156492): (a) identifying the market frictions that prevent the formation of productive trading relationships between buyers and sellers, and (b) testing approaches to targeting these frictions to improve contracting and welfare for both parties. Potentially welfare-enhancing trading relationships will not form if coordination costs are high (for instance, a buyer must contract with and monitor many smallholder farmers), contract enforcement is challenging, or liquidity and scale constraints prevent farmers or firms from undertaking productivity enhancing investments. The IEs proposed here seek to evaluate the importance of intermediation and relationship-specific investment on contracting, trading, and contract completion in the short-term, and income, productivity, and employment in the long-term. Specifically, the IEs will focus on specific elements of ZATP related to Component 1 – Market Linkages in Agribusiness, and Component 2 – MSME Supplier Development Program.

The IE team has made a concerted effort to engage with a variety of stakeholders in developing and refining the IE design. The first draft of the IE design came about as a result of the DIME-T&C workshop in Mexico in February 2017. The client was represented by two members of the Ministry of Commerce, Trade and Industry (MCTI) who are directly involved in the design of the project. The Operations TTL was also present throughout the week. Both client representatives and the TTL were actively involved in discussions throughout the week, taking special interest in the overall research questions, the randomization design and the timeline.

Following the workshop, the IE team – through facilitation from the Operations TTL – engaged with the T&C regional team and the relevant Senior Private Sector Specialist with the dual aims of gaining buy-in for the IE design and gaining an insight into outstanding questions that might help inform broader lending operations. Given the scarcity of experimental evidence on the issue, she was encouraged by the team's effort to bring rigorous methods to the table. She expressed specific interest in the fact that the team was attempting to design an IE that would disentangle the many mechanisms at play, as opposed to dealing with the program as a "one-stop-shop".

Finally, two members of the IE research team travelled to Lusaka on a scoping mission in May 2017. They engaged with a number of stakeholders from within MCTI as well as other private and public sector actors in Lusaka. The mission was crucial in refining elements of the IE design related to the business-plan

support arm of the project, along with overall buy-in to the IE design. Additionally, the team benefited from the strong insight of relevant client counterparts in terms of plans for implementation including timelines and operational modalities that affect the IE design. Lastly, the team had the opportunity to organize an IE workshop for members of MCTI and the Ministry of Agriculture, with the aim of gaining institutional support from the implementers and acquiring insight into how the implementation plan will affect some of the plans for the identification design and strategy.

2. Intervention to be Evaluated

The IEs focus on two components of the ZATP – one between farmer/producer groups and their buyers and the second between agribusiness SMEs and their buyers. Each of these two components will have its own associated IE.

The first IE focuses on Productive Alliances (PAs), or groups of farmers matched to a buyer. Under the project, Productive Alliances will receive: i) training and support on the development of a business plan, (ii) intermediary assistance in executing a detailed business plan and iii) a Matching Grant to carry out productive investments relevant for the alliance. In addition to the business plan execution, the intermediary assistance might involve, if applicable, information about markets, assistance in planning to meet orders, assistance in interpreting and meeting quality requirements, certification of quality, price information and other informational and managerial support. The IE will focus on evaluation of (ii) and (iii); both treatment and control PAs will receive (i).

The second IE focuses on agribusiness SMEs, which will receive: i) tailored technical support through a service known as MarketConnect and ii) a Matching Grant to support productive investments. The specialized support through MarketConnect in (i) will include provision of (a) information about the SME's relationships with buyers and their requirements, terms, and conditions; (b) problem solving and coaching around specific business challenges uncovered through a diagnostic of the SME, and (c) a strong network of specialized providers who can be brought in for unique technical challenges. The IE will cover both (i) and (ii).

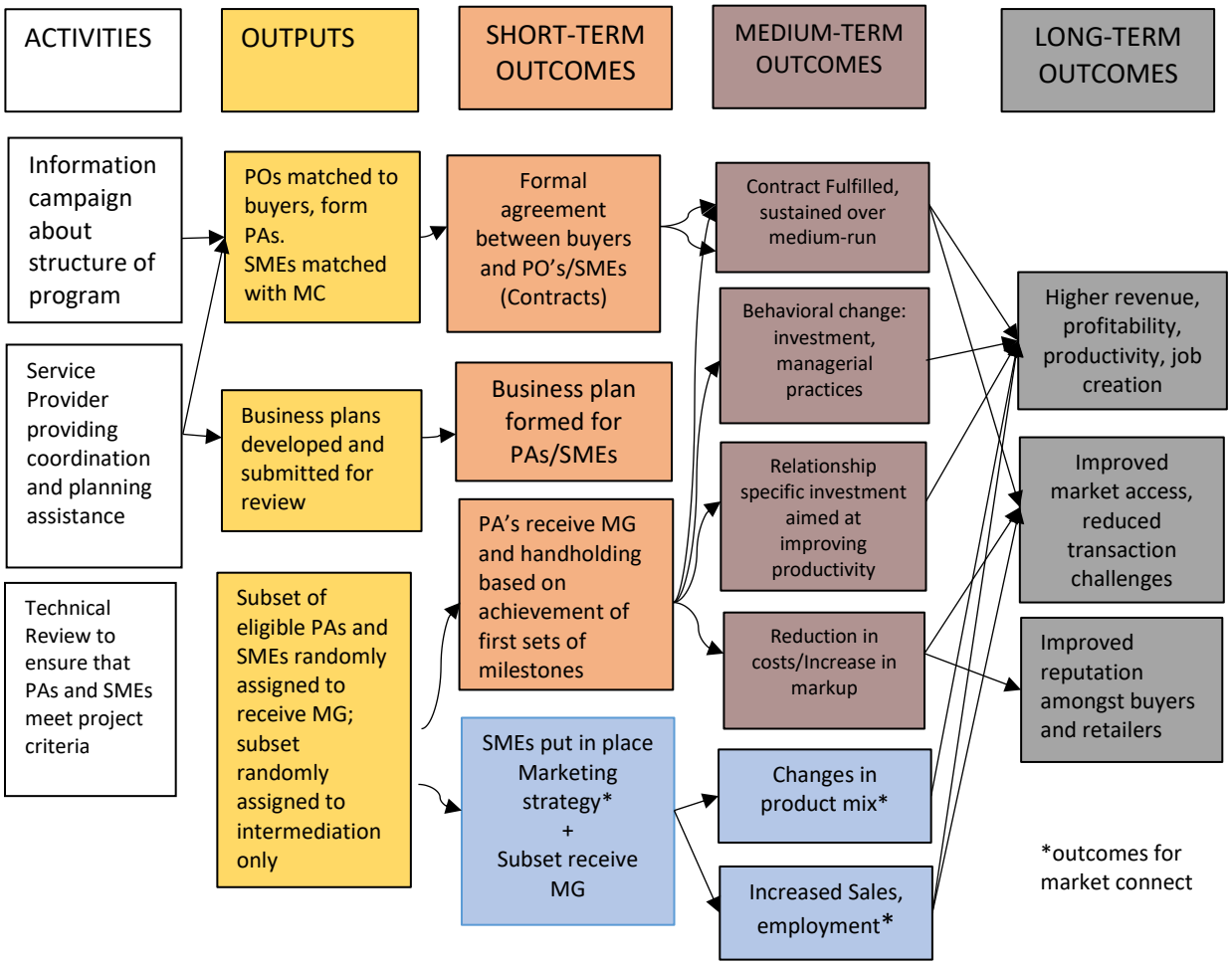
While the two IEs are distinct, they focus on similar themes, and therefore have overlapping outcomes of interest. Some of those – starting off with short term outcomes, and moving into longer-term outcomes – include:

- Contracts/formal agreements with buyers signed
- Business plans designed
- Relationship-specific investment aimed at improving productivity
- Reduction in costs + Increase in markups
- Changes in product/crop mix
- Increased sales, employment
- Higher revenue, profitability and productivity
- Improved reputation amongst buyers and retailers

A summary table of key intermediary and ultimate outcomes of interest and the possible data indicators is in the appendix.

3. Theory of Change

While the scale of the impacts and the levels at which they occur will be different across the two IEs, the conceptual framework that underpins the theories of change is very similar. We therefore describe the theory of change figure for both interventions together.



The first-stage output in the process for the PA intervention is a successful matching process that matches farmer groups to buyers if they are not matched at the time of application. Both these alliances and the SMEs in the Market Connect intervention are provided technical assistance (TA) to develop business plans, and choose to apply for matching grant support. The short-term outcomes from this TA is an agreement amongst the matched groups regarding the business plan and future agreements/contracts as a result of reduced coordination, search, and contracting costs. Carrying out the business plans might require capital investments in specific assets, which most of these farmers and SMEs are unable to make due to risk aversion and/or limited access to financial services. The project will subsidize those investments through matching grants to a subset of eligible applicants. Medium-term outcomes include implementation of business plans over the next several months leading to a change in the investment and/or managerial processes of the alliances. In addition, business relationship-specific investments to boost productivity and to reduce costs/increase markups are expected. SMEs might begin to transform the product mix, and see increased sales and employment. The long-term outcomes that result from any number of the outputs, and the short/medium-term outcomes include: (a) higher

revenue, profitability and productivity, (b) improved market access, reduced transaction challenges, (c) job creation, and (d) improved reputation amongst buyers and retailers. This is detailed in the theory of change figure.

4. Literature Review

The intervention on PAs is primarily related to the literature on the impact of intermediaries and the impact of liquidity constraints in trading relationships. Rigorous evidence on the role of intermediation in contracting is relatively scarce, and few econometric studies assess the effects of independent third parties on farmer's contract enforcement (Balineau 2013 & Torero 2011, Saenger et al 2013). Experimental evidence on the impact of contract farming on farmer's performance is also limited. The ability of smaller farmers to access larger buyers may be limited by frictions such as credit constraints and information (Key and Runsten, 1999, Simmons et al, 2005). Furthermore, liquidity constraints have been shown to be extremely important in explaining the existence of intertemporal arbitrage opportunities in agricultural markets in Kenya, where lack of storage facilities compel farmers to sell at low prices during harvest time and buy at higher prices during lean seasons (Falcao Bergquist, Burke and Miguel 2017), as well as suboptimal household sectoral labor allocation in Zambia (Fink, Jack and Masiye, 2017).

The project will aim to test the relative value of the various functions provided by intermediaries that previous studies have highlighted, such as technical assistance and access to markets (Bardhan, Mookherjee, and Tsumagari (2013)), as well the impacts of intermediaries on farmer behavior and outcomes on trading relationships. We will also test the impact of access to intermediaries on pass-through of output prices and their volatility to farmers, as well as the role of liquidity on the characteristics of trading relationships and the division of surplus within the trading relationship – for instance, if the matching grant relaxes liquidity constraints for farmers who get certification for their crops, we will estimate what portion of the mark-up accrues to the farmer relative to the intermediary. Pass through in agricultural markets has typically been shown to be low (Casaburi and Reed (2013), Falcao Bergquist (2017)), with markets exhibiting collusive behavior by traders to maintain high mark-ups, though there is some evidence that different aspects of trading relationships might be affected such as the probability of extending credit (Casaburi and Reed (2013)). If technical assistance or liquidity increase pass through for positive price shocks due to higher quality production by farmers or by enabling better bargaining with traders, farmers can better access returns to being linked to markets. Furthermore, our data will allow us to test whether access to liquidity in one trading relationship affects mark-ups and terms of other trading relationships.

The second intervention provides a combination of customized business development services and liquidity (a matching grant) SMEs. There is a growing literature on the returns to customized business development services on micro (Karlan, Knight, and Udry (2012)), small and medium (Bruhn, Karlan, and Schoar (2017)) and large enterprises (Bloom et al. (2013)), as well as on the returns to capital grants (De Mel, McKenzie, and Woodruff (2008), McKenzie (2015), McKenzie, Assaf, and Cusolito (2017)). The impacts of providing business development services have found mixed results, with positive effects on SMEs and large enterprises, and no returns on micro-enterprises. Studies on matching grants find positive effects, though conducting RCTs of matching grants is usually challenging (Campos et al. (2014)). The closest study to the consulting arm of the intervention is Bruhn, Karlan, and Schoar (2017), who find large returns to consulting services for SMEs in Mexico, including long-term effects (5 years later) on employment and scale. We would test the effects of both liquidity and business development services,

which in this setting of high interest rates and barriers to entry such as certification costs might have greater transformative effects than either of these interventions alone. Furthermore, we will estimate the effects on investments that may plausibly affect firm profits, such as investments in certifications, which allow a firm to access new markets, as well as trading relationships. Thus, we would estimate the combined effects of two interventions that have been shown to have positive effects on SMEs in other settings, and complement the estimation with data on newer margins that might be affected by the interventions, such as trading relationships.

5. Hypotheses and Evaluation Questions

The Productive Alliances theory of change hypothesizes that access to intermediaries and liquidity affect farmers' ability to access more reliable demand and trading relationships, which allows them to connect to the value chain and increase returns to farming. For Market Connect, the theory of change hypothesizes that customized consulting and liquidity impact their ability to achieve more efficient input allocation (by e.g. relaxing constraints like credit) as well as possibly change their product mix, access new trading relationships, and grow more quickly.

The main evaluation questions of the study are as follows:

Productive Alliances:

1) How does technical assistance in executing a business plan impact trading relationships (relationship length, surplus division, investment, returns to farmers such as revenues and profits, input allocations, crop mix, movement into higher value operations, spillovers in other trading relationships)? Since the technical assistance may perform several functions, the IE will test which have the highest relative value for a trading relationship.
2) How does liquidity (addressed through the matching grant), in addition to the technical assistance in executing a business plan, impact trading relationships, including outcomes such as relationship length, surplus division, investment, returns to farmers such as revenues and profits, input allocations, crop mix, movement into higher value operations, spillovers in other trading relationships?

Market Connect

3) How do customized business development services impact SME outcomes, including costs, input allocations, returns such as revenues and profits, product mix, the formation of trading relationships and division of surplus within trading relationships?
4) How does customized consulting and liquidity (matching grant) impact SME outcomes, including costs, input allocations, returns such as revenues and profits, product mix, the formation of trading relationships and division of surplus within trading relationships?

The evaluation questions are based on conversations with the Ministry of Trade, Commerce and Industry (MCTI) and the Project Task Team Leaders. The questions aim to identify feasible interventions that would provide information useful for scale-up of the project, while at the same time contribute to the literature on SME growth and agricultural development.

6. Evaluation Design and Sampling Strategy

The Productive Alliances intervention comprises a randomized evaluation of the impact of providing technical assistance in executing a business plan as well as a matching grant to Productive Alliances (groups of farmers, known as Productive Organizations, matched to buyers). The IE will estimate the effects of the intervention on features of the trading relationships, as well as farmer-level outcomes. The interventions have a clustered design (since Productive Alliances include groups of farmers, and we will collect data at the farmer-level) with two treatment arms – one for technical assistance to facilitate implementing the business plan, and one for both technical assistance and a matching grant.

The Market Connect evaluation will estimate the impact of providing customized business development services as well as a matching grant to agribusiness SMEs on their managerial decisions, input allocations, sales and profits, as well as their trading relationships. It is a single-level trial (i.e., randomized across SMEs) with two treatment arms, one for customized business development services, and one for both customized business development services and a matching grant. Figures illustrating the design of both interventions are included in the appendix.

The intended targets of the Productive Alliances intervention are groups of emerging farmers, defined by the project as farmers who cultivate less than 5 ha of land and/or own less than US$50,000 worth of total assets, which will be paired with buyers. The intended targets of the MarketConnect intervention are growth-oriented agribusiness SMEs with annual turnover of between 70,000-500,000 USD.[1] In both the PA and MC interventions, a minimum eligibility requirement[2] is set by the implementing agency, the MCTI.

The project's outreach activities and initial target areas will cover the regions that have both high poverty density and agro-processing activities, comprising Lusaka, Kabwe, Ndola, Livingstone, and Chipata, and surrounding areas (a 300 km radius). The providers of technical assistance to the productive alliances as well as the provider of consulting services to SMEs will be determined by the Ministry based on a competitive bidding process. The IE team is in discussions with the MCTI regarding accessing data that are representative of farmer co-operatives and SMEs, so that we can understand the selection into signing up for the program, and thus understand the generalizability of our estimates.

6.1 Treatment and Control Groups

We have worked with the stakeholders to design the two randomized impact evaluations, each of which comprises two treatment arms.

In the Productive Alliances intervention, the two treatment arms are:

i. technical assistance by intermediaries to facilitate implementation of the business plan, and
ii. technical assistance by intermediaries combined with a matching grant.

The pool of eligible farmer groups who have been matched to buyers in a productive alliance, and whose business plans have passed a minimum quality bar will be randomly allocated into the two treatments groups cited above, and a control group. The level of randomization is thus at the alliance level. We will

[1] 'Agribusiness SMEs' are, for the purpose of this project, defined as for-profit companies that do agro-processing (transformation of agricultural raw materials), or that provide services to agro-processors, such as logistics (i.e. cold chains), packaging or manufacturing equipment.

[2] Still being determined as members of MCTI put together the final pieces of the implementation plan

stratify by variables such as whether the farmer groups were already selling to the buyer before the program (age of the trading relationship), whether the farmer groups matched themselves to the buyer or were matched by the project's Project Implementation Unit (PIU), as well as the competitiveness of the markets in which they operate

The MarketConnect impact evaluation will also comprise two treatment arms:

i. customized business development services (comprising technical support, buyer knowledge, matching to buyers etc. – described in greater detail in Section 2), and
ii. customized business development services + a matching grant for agribusiness SMEs. This is a royalty bearing matching grant in the range of US$10,000 to US$100,000 per firm, in addition to the MarketConnect consultancy.

The level of randomization is the SME. After screening, eligible SMEs selected from all those that apply to be a part of the program will be randomly assigned to the two treatment arms above and a control group. This allows us to distinguish the impact of providing customized support to firms (treatment 1) along with that of relaxing liquidity constraints (treatment 2) for SMEs.

6.2 Sample Size Calculations

The project seeks to include 180 productive alliances (each with 10-40 farmers) in each of the treatment arms as well as 180 productive alliances in the control group. Each farmer group is thus a cluster, and is the level of treatment. Table 2 includes Minimum Detectable Effects Size for a range of assumptions regarding cluster size and intra-cluster correlation, and indicates that the Minimum Detectable Effects Size ranges from 0.1 SD (for 40 farmers per cluster and an intra cluster correlation of 0.1) to 0.18 SD (for 10 farmers per cluster and an intra-cluster correlation of 0.3).

Table 1: Minimum Detectable Effect (80% power, 5% significance level): Productive Alliances

Number of Clusters (180 in each treatment, 180 in control)	360	360	360	360	360	360	360	360	360
Cluster Size	10	10	10	20	20	20	40	40	40
Intra-cluster correlation	0.1	0.2	0.3	0.1	0.2	0.3	0.1	0.2	0.3
Minimum Detectable Effects Size	0.13	0.16	0.18	0.11	0.15	0.17	0.1	0.14	0.17

For the Market Connect intervention, if we consider a single treatment arm of 150 SMEs against the control group of 150 SMEs, at 80% power and 5% significance level, the Minimum Detectable Effect Size is 0.3 SD. If we pool the two treatment arms together, the Minimum Detectable Effect Size is 0.2 SD, which is equal to the short-term effect sizes of consulting provided to SMEs in Mexico by Bruhn et al (2017).

For both of these impact evaluations, we will do several things to improve power of our analysis. For example, we will enroll a subsample of farmers and SMEs in a high frequency data collection sample, for whom we will measure key outcomes on a monthly basis. This more frequent data collection will be designed to improve power. In addition, if take up is low, we will use the survey data collection costs freed up by low participation rates to extend the primary data collection for another year to improve power. We will also block randomize based on known baseline characteristics and geographic or market-specific indicators.

7.Data Collection

7.1 Quantitative Instruments

We will rely on three main data sources:

1) Survey data collection
   Survey data will be collected from farmers (PA) and SMEs in three primary waves: one baseline, and two follow up surveys.

Baseline

- For the PA IE, our sample consists of producer organizations after formation of buyer-seller relationships in a PA system, and whose business plans have passed the minimum requirement for eligibility into the matching grant.
- For the Market Connect IE, our sample consists of promising SMEs that have also met the eligibility criteria of the project as described in earlier sections.

Baseline data collection will focus on all these groups, and gather information on our outcome variables (see section 3), in addition to the following key measurements:

- The history of farmer participation in producer organization(s) (PA only).
- Input and output measures, including price detail, sufficient to calculate markups and profits (both).
- Past and current marketing and trading relationships (both). This will include detail sufficient to match SME identified across the farmers and SME surveys.
- Past experience with business plans and marketing strategies (both).
- Other details to generate control variables, such as crop mix, education levels, scale of operation, etc. (both).
- Plans for the coming year and subjective expectations (both).
- Self-reported descriptions of business plans and marketing strategies, for comparison against written documents (both). This will allow us to assess interpretations of the intervention.

The baseline sample will be tracked across all primary data collection rounds even if, for example, the producer organization dissolves.

Follow up

We will collect primary (medium and long-term) outcome data in two follow up waves, the first of which will occur post-harvest, following the first agricultural season impacted by the intervention. The second follow up wave will occur one year later, to allow us to observe the persistence of impacts and relationships. In both waves, we will track the outcome variables measured at baseline, in addition to:

- Repeat measures of inputs and outputs, with sufficient detail to calculate markups and profits and observe changes in investment and production decisions since baseline
- Current marketing and trading relationships, including detail on any changes in these relationships over past year.

- Questions specific to business plans and marketing strategies to assess adherence to and innovation with respect to submitted plans.
- Tracking of interventions, including self-reports on spending of matching grant, health of trading relationships, and adjustments to contractual relationships.

In addition to these primary survey rounds, we will enroll a subsample of farmers and SMEs in a high frequency data collection sample, for whom we will assess inputs and investments, and measure trading relationship activities on a monthly basis. This more frequent data collection will be designed to improve power. In addition, if take up is low, then we will use the survey data collection costs freed up by low participation rates to extend the primary data collection for another year to improve power.

We might also use experimental games to elicit trust and cooperation (Berg et al. 1995) amongst farmer's organization members, and see the extent to which they influence outcomes.

2) Administrative data sources

   We will rely on a number of different administrative data sources, some of which will come from the project itself and some of which will come from the market actors' own records.

   a) Business plans and marketing strategies: We will code and analyze the content of the business plans and marketing strategies, both as an outcome (to see if they differ across treatment arms) and to interpret their effect on eventual outcomes. In all likelihood, these measures will not be available in the control group, where we do not expect written business plans or marketing strategies to exist.
   b) Accounts and receipts: We will request access to participating SME accounts, which will allow us to analyze both the quality and content of SME bookkeeping as it pertains to transactions associated with both the Productive Alliances and Market Connection components of the evaluation. In addition, we hope to obtain third party records of sales and purchases through the Zambian Revenue Authority (associated with VAT records) to verify reported transaction volumes.

3) Audio recordings of trading partner interactions

   We will record the meetings between intermediaries and sellers and buyers, transcribe, code and analyze the discussions. This will inform the question of why intermediation (consulting) does or does not affect trading relationships and enterprise success.

We will measure selection into the program by comparing the characteristics of farmers and SME's in the project sample with the same characteristics recorded in Ministry of Agriculture and Ministry of Trade records.

Finally, we will calibrate spillovers by constructing measures of market proximity and treatment intensity using baseline survey measures and treatment assignment. In market segments receiving greater treatment intensity, we anticipate larger spillover effects.

7.2 Management of Data Quality

We will employ current best practices in survey data collection. These will include the use of a highly experienced data collection team and careful training of enumerators involving a careful screening for quality. Enumeration will rely on electronic data collection, which will be coded to minimize errors, and will be checked as surveys are uploaded in real-time to catch any systematic confusion or mistakes before they contaminate the data collection. A randomly selected subsample of surveys will be back-checked to verify accuracy and compliance of the survey team. In addition, for surveys of firms, we will employ telephone based back-checks on a larger sample of observations.

Survey data collection will also be verified through cross checks against administrative data sources. We will compare self-reported production and purchase values with those observed in administrative sources. In addition, we will carefully check the quality of administrative data sources. For both farmers and firms, we will have observations from both buyers and sellers. Much as Value Added Tax receipts have been used to check for accuracy in reporting, we will match buyers and sellers to verify consistency across sources. Where discrepancies arise, we will send enumerators for further investigation.

7.3 Ethical Issues

Survey data collection will require IRB approval from both Zambia's Research Ethics Committee and from the Universities of the academic evaluation team members. All survey data collection will begin with verbally administered informed consent. Respondents will be asked to sign and will be provided with a hard copy of the consent form.

Given the study's focus on firms, ethical considerations primarily involve considerations of confidentiality and anonymity. All data collected as part of the project will be anonymized and stored securely and separately from identifying information. Individual identifying information – about firms and individual farmers – will not be shared with anyone outside of the research team, to match with IRB requirements.

7.4 Qualitative Instruments

Our survey data collection rounds will include some qualitative questions to complement our quantitative analyses:

- at baseline, about farmers and SME owners' experience and perception of the primary constraints affecting their activities, perception of the potential role for intermediaries and consulting services, or opinions about which other interventions might be relevant;
- at endline, about farmers and SME owners' experience, participation, and satisfaction with the various components of the program interventions. This will allow us to better understand mechanisms and potential spillover.

7.5 IE Implementation Monitoring System

Implementation will be monitored in several ways. Different stages of the project will generate different project records, which will allow the evaluation team to check the timeliness and completeness of implementation. Specifically, records of the farmer groups applying to the PA phase will be inputs to randomization. We will then be able to check these against the implementation of treatments to ensure adherence to the research design.

We will track participation at each level: farmers, buyers and SMEs, starting from the baseline identification of the subject pool. We will rely on implementation records but maintain a parallel set of records that will be checked against original data collected by the evaluation team. Part of that original data collection will involve questions related to treatment status, which will allow us to cross check the project records.

We will monitor each stage along the theory of change, both for impact evaluation monitoring purposes, but also to allow us to better interpret our final outcomes. First, we will track short term outcomes by monitoring farmer participation in producer organizations, relationships with SMEs and buyers, and immediate treatment effects on business plans and marketing strategies. Second, we will track medium term outcomes by monitoring business plan implementation and longevity using a combination of administrative and survey-based measurement tools (see previous section). We will use survey data on indicators of improved financial success including changes in investment, inputs and product mix. Finally, we hope to measure longer term outcomes, also using survey instruments, to measure revenue and profits, along with market level impacts. We will use administrative and third party records to validate survey measures, as described below.

8. Data Processing and Analysis

8.1 Data Coding, Entry, and Editing

All data will be collected using electronic surveying procedures. Thus, data entry for surveys will not be necessary. Problems with missing survey data will be minimized through careful survey coding to minimizing skipping questions inappropriately. To the extent that we continue to be faced with missing data, we will code missing variables used as controls and will compute bounds on outcomes if key outcome variables are missing. Importantly, we will check for balance in any attrition or missing data patterns that we observe.

For other data sources, such as business plans or firm accounts, entry may be required. Data entry will be conducted by trained data staff using preprogrammed entry templates designed to minimize entry errors. All data will be double entered and non-matching entries will be checked against originals.

8.2 Model Specification for Quantitative Data Analysis

We will employ regression analysis to estimate treatment effects. Our main specification will be an OLS regression with treatment interactions and baseline controls. In the case of multiple rounds of outcome data, we will stack observations and control for the baseline value of the outcome variable. Standard errors will be clusters appropriately.

For revenue and cost related outcomes, we will log transform the data and – as needed – top code extreme outliers. Some outcomes will be measured only once, while others will be collected at higher frequency.

We will also use the treatment assignment as an instrument for take up to recover the local average treatment effects using two stage least squares. While the ITT is of direct policy interest, the LATE can help us understand the magnitude of effects on participating firms. To the extent that participation is high, these measures will be similar.

We will also test for spillovers based on indicators of treatment intensity, which we will use to estimate heterogeneous treatment effects. In particular, in more competitive markets, we expect to see larger spillovers, which may negatively impact control farmers and firms in these market segments. Further, we will use some qualitative measures to understand the extent of these spillovers, asking farmers, buyers and SME owners about program knowledge as well as the participation of other individuals in the program.

Multiple hypothesis testing is a concern in this study and we will address it in a few different ways. First, we will use a more conservative significance threshold. Second, we will construct families of outcomes that we will use to minimize the number of independent outcomes of interest involved in our analysis, and adjust using a family wise error rate.

We will perform standard tests for balance and attrition using baseline data to compare observables both across treatment arms at baseline, and also at each stage of the program implementation. In some cases, attrition may be an outcome of interest in its own right and we will, as needed, estimate treatment effect bounds using methods such as those proposed by Lee (2009).

9. Study Limitations and Risks

We perceive three main threats to internal validity: (1) take up may be low, (2) spillovers may make treatment impacts hard to interpret, (3) mechanisms may be impossible to isolate/identify. We discuss each in turn.

(1) Low take up is a threat both to the evaluation and to the project as a whole. The evaluation will deal with low take up by extending the number of survey rounds and increasing the fraction of the sample involved in high frequency data collection. This will allow us to substitute T for N in our analysis to some extent, and salvage some of the statistical power threated by low take up rates.
(2) Spillovers are of direct interest in the impact evaluation and measuring variation in treatment intensity across market sectors should allow us to isolate some of the spillover effects. However, to the extent that they are large or homogenous, we may struggle to separate treatment effects from spillovers. We will use baseline data to assess the degree of this threat and adjust the design as needed.

(3) The study design is ultimately a bundled intervention. While we hope to isolate causal mechanisms as much as possible with careful data collection, we may ultimately be unable to distinguish subtle differences in why we observe certain treatment impacts. While we do not see this as a threat to the policy relevance of the study, it does hinder generalizability to some degree. We also hope to learn more about mechanisms by complementing our quantitative analyses with qualitative measures.

Understanding causal mechanisms is important for external validity. Knowing why the project succeeded or failed in the Zambian context is key for determining where and how it can be best generalized. Therefore, we will place a high premium on measuring and identify these mechanisms.

The project sample will be self-selected and drawn from six districts across Zambia. Given that only minimal criteria will be involved in sampling, we expect the eventual project sample to be generalizable to that which might select into a similar program in other contexts. The partnership between the Ministry of Trade and the Ministry of Agriculture is also likely to generalize well to other contexts seeking to stimulate productive market exchange in the agricultural sector. Finally, the fact that this project will already occur at a fairly large scale improves the potential for scale up. We see no barrier to further scaling the model as currently designed, if it is shown to be successful.

10. Policy Relevance and Impact

Agri-food chains around the world, including and especially in developing countries, have been witnessing rapid transformation as a result of globalization, urbanization, and a growing middle class with increasing income. This is leading to a dietary transformation and increasing demand for high value, processed, and niche food products. The modernization of agri-food retail chains, with the diffusion of supermarkets, hotels, and restaurants chains spreading beyond big-city markets into smaller towns and poorer areas of sub-Saharan Africa, as well as agro-export systems with the proliferation of grade and standards are evidence of such transformation (Henderson and Isaac (2017), Barrett et al. (2012), Weatherspoon and Reardon (2003), Reardon et al. (2003)). This represents a huge opportunity for modernized agricultural growth and job creation for the rural households whose livelihood is primarily based on agricultural activities. For example, Bellemare (2012) shows evidence of positive welfare effects of participation in export value chains through contract farming in rural Madagascar. However, this also represents a big challenge, given that modern procurement systems usually rely on purchase consolidation, shifts to specialized wholesalers, and tough private quality and safety standards not easily met by local producers (Weatherspoon and Reardon (2003)). This challenge has led, in many cases, to the exclusion of small-scale producers from these high value supply chains, who thereby miss out on the opportunities created by the value chain transformation.

With poverty reduction and shared prosperity as goals, it becomes imperative to understand which policies interventions are effective at improving inclusion of local producers in these modern value chains. In particular, what are the market frictions preventing the formation of productive trading relationships between these small-holder producers and large buyers in rapidly modernizing retail and export value

chains? What technical and economic inefficiencies affect the performance of small and medium local agri-business enterprises? And how does targeting these frictions improve trading relationships and welfare?

These questions are at the heart of the two impact evaluations in this proposal, that seek to specifically respond to the outstanding questions in the literature. Further, by rigorously evaluating a program that is being implemented at-scale, by a government agency, these evaluations have the potential to provide valuable policy-advice both in Zambia and beyond. Given the importance of the agricultural sector in increasing income for the bottom 40 percent, strengthening agricultural value chains for increased income and job creation has emerged as priority areas in the Sustainable Development Goals. In addition, given the multi-sectoral nature the programs, the IEs will provide valuable knowledge about one way towards these goals.

Finally, T&C's lending priorities include growth, aggregate productivity, quality jobs and rising incomes. To this end, promoting an inclusive and dynamic private sector growth agenda through development of market linkages becomes crucial, and it is at the heart of this Project. The related IEs aim to help measure the Project's effectiveness in achieving these outcomes.

11. Dissemination Plan

The Baseline data collection and analyses will help to inform the government of Zambia from the early stages of projects implementation about the main constraints faced by the potential beneficiaries of the project, and guide potential reorientation or intensification of the project interventions to maximize success. The research team plans to organize a baseline workshop conference in Lusaka to share some of these results and help guide the discussion on the roll-out of the program.

Upon completion of the follow-up surveys related to the IE, the research team will work closely with the government to produce relevant policy briefs and facilitate a dissemination workshop for all local stakeholders.

The impact evaluation is also linked with a global research platform through DIME, Tufts University, and Harvard University – the home institutions of the main IE team members. Zambian policymakers involved in this project will be invited to participate in and present the IE results at large international workshops with speakers from academic and policy-making spheres, involved in similar issues. This will allow them to engage in a global discussions and knowledge exchange about these interventions, which will maximize the potential for the IE results to influence future policies in Zambia and beyond.

In addition to delivering evidence on key operational questions, the proposed evaluation will produce high-quality research papers that will be presented at BBLs at the World Bank (e.g. DECRG seminar series), seminars series at Tufts University and Harvard University, as well as international development conferences. The findings will be published in the World Bank working paper series and submitted to peer-reviewed economics and field journals, thus reaching a wide audience of researchers and policy makers worldwide. All data will be made available online on the databank for IE, following the Bank's open data policy.

11. Impact Evaluation and Related Teams

Table 2: Impact Evaluation Team

Name	Affiliation	Role in IE team	Email
Namrata Kala	Harvard University	Principal Investigator	kala@fas.harvard.edu
Kelsey Jack	Tufts university	Co-Principal Investigator	Kelsey.Jack@tufts.edu
Guigonan Serge Adjognon	World Bank Group	IE TTL – IE Coordinator	gadjognon@worldbank.org
Saahil Karpe	World Bank Group	Co-Principal Investigator	skarpe@worldbank.org
TBD	World Bank Group	Research Assistant	
TBD	World Bank Group	Field Coordinator	

Table 3: Related World Bank Project Team (Project ID: P156492)[3]

Name	Title	Role	Email
Tugba Gurcanlar	Senior Private Sector Specialist	TTL	tgurcanlar@worldbank.org
Peter Nuamah	Senior Private Sector Specialist	Co-TTL	pnuamah@ifc.org
Wilhelmus Gerardus Janssen	Lead Agriculture Economist	Co-TTL	wjanssen@worldbank.org
Henry Sichembe	Consultant	In charge of project implementation	hsichembe@worldbank.org

[3]The full World Bank Project Team is entered as Table A2 in the Appendix

Table 4: Country Counterparts

Name	Title	Agency	Role	Email
Mwila M. Daka	Chief Planner	MCTI	Decision maker and key counterpart	Mwila.daka@mcti.gov.zm
Mike Chivuno	Senior Planner	MCTI	Key Advisor	Mike.Chivuna@mcti.gov.zm
Chimuka Manyepa Mwila	Economist	MCTI	Senior Member of Design Team	Chimuka.manyepa@gmail.com
Gloria Phiri	Project Manager	ZATP	Key Program Manager	glorianphiri@gmail.com

12. Budget

Table 5: Impact Evaluation Budget Summary

Budget Summary					
Budget Composition	FY18	FY19	FY20	Total Cost (USD)	% of total budget
Staff	27000	30000	30000	87000	8.8
STC	55750	74500	39750	170000	17.2
Data collection	200000	200000	200000	600000	60.7
Travel	20500	43000	24000	87500	8.9
Conference arrangements	20000	0	24000	44000	4.5
TOTAL	323250	347500	317750	988500	
Sources of Funds					
ComPEL	92750	74500	82750	250000	25.3
Project Budget	200000	200000	200000	600000	60.7
Money Raised by TTL through 'Jobs' Initiative	20000	20000	20000	60000	6.1
TBD	10500	53000	15000	78500	7.9
TOTAL BUDGET	323250	347500	317750	988500	

13. Milestones, Deliverables, and Timeline

Milestones	Deliverables	Completion Date MMM, YYYY
Concept Note	Note (including budget and timeline) PowerPoint presentation IE design workshop	Jun, 2017
Baseline data collection	Ethics protocol and approval Survey firm terms of reference Questionnaire and surveyor's manual Field procedures Data protocols	December, 2017
Baseline analysis	Database file and Do files Data analysis note (baseline report) Baseline workshop and dissemination conference and ppt	May, 2018
Intervention monitoring	Rollout plan Monitoring reports verifying treatment and control status Implementation report Implementation workshop and dissemination conference and ppt	August, 2018
Midline data collection	Survey firm terms of reference Questionnaire and surveyor's manual Field procedures Data protocols	December, 2018
Final data collection	Survey firm terms of reference Questionnaire and surveyor's manual Field procedures Data protocols	December, 2019
Final analysis	Data analysis note Policy note, including cost-effectiveness of arms Database file and Do files Midline/final workshop and dissemination conference and ppt	Mar, 2019

References

1) World Development Indicators." World Development Indicators | Data. Accessed June 1, 2017. http://data.worldbank.org/data-catalog/world-development-indicators.

2) Balineau, G. 2013. “Disentangling the Effects of Fair Trade on the Quality of Malian Cotton.” World Development 44, 241–255.

3) Bardhan, Pranab, Dilip Mookherjee, and Masatoshi Tsumagari. "Middlemen margins and globalization." *American Economic Journal: Microeconomics* 5.4 (2013): 81-119.

4) Barrett, C. B., Bachke, M. E., Bellemare, M. F., Michelson, H. C., Narayanan, S., & Walker, T. F. (2012). Smallholder participation in contract farming: comparative evidence from five countries. World Development, 40(4), 715-730.

5) Bellemare, M. F. (2012). As you sow, so shall you reap: The welfare impacts of contract farming. World Development, 40(7), 1418-1434.

6) Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and economic behavior*, *10*(1), 122-142.

7) Bruhn, Miriam, Dean S. Karlan, and Antoinette Schoar. "The impact of consulting services on small and medium enterprises: Evidence from a randomized trial in Mexico." (2017).

8) Burke, Marshall. "Selling low and buying high: An arbitrage puzzle in Kenyan villages." Working Paper. (2017).

9) Casaburi, Lorenzo, and Tristan Reed. “Interlinked transactions and pass-through: Experimental evidence from Sierra Leone.” (2013).

10) Campos, Francisco, et al. "Learning from the experiments that never happened: Lessons from trying to conduct randomized evaluations of matching grant programs in Africa." *Journal of the Japanese and International Economies* 33 (2014): 4-24.

11) De Mel, Suresh, David McKenzie, and Christopher Woodruff. "Returns to capital in microenterprises: evidence from a field experiment." *The Quarterly Journal of Economics* 123.4 (2008): 1329-1372.Falcao Berquist, Lauren. “Pass-Through, Competition, and Entry in Agricultural Markets: Experimental Evidence from Kenya” (2017).

12) Fink, Günther, B. Kelsey Jack, and Felix Masiye. “Seasonal credit constraints and agricultural labor supply: evidence from Zambia.” No. w20218. National Bureau of Economic Research, (2017).

13) Henderson, H., & Isaac, A. G. (2017). Modern Value Chains and the Organization of Agrarian Production. American Journal of Agricultural Economics, aaw092.

14) Karlan, Dean, Ryan Knight, and Christopher Udry. Hoping to win, expected to lose: Theory and lessons on micro enterprise development. No. w18325. National Bureau of Economic Research, (2012).

15) Key, Nigel, and David Runsten. "Contract farming, smallholders, and rural development in Latin America: the organization of agroprocessing firms and the scale of outgrower production." World development 27.2 (1999): 381-401.

16) McKenzie, David, Nabila Assaf, and Ana Paula Cusolito. "The Additionality Impact of a Matching Grant Program for Small Firms." (2016).

17) McKenzie, David J. "Identifying and spurring high-growth entrepreneurship: experimental evidence from a business plan competition." (2015).

18) Reardon, T., Timmer, C. P., Barrett, C. B., & Berdegué, J. (2003). The rise of supermarkets in Africa, Asia, and Latin America. American journal of agricultural economics, 85(5), 1140-1146.

19) Saenger, C., Torero, M., and Qaim, M. 2013. “Impact of Third-Party Enforcement of Contracts in Agricultural Markets – A Field Experiment in Vietnam.” Retrieved from http://www.econstor.eu/handle/10419/90613

20) Simmons, Phil. "Overview of smallholder contract farming in developing countries." Armidale, Australia: Graduate School of Agricultural and Resource Economics, University of New England (2002).

21) Torero, M. and A. Viceisza. 2011. “Potential collusion and trust evidence from a field experiment in Vietnam.” Discussion Paper 01100. International Food Policy Research Institute. Washington, D.C.

22) Weatherspoon, D. D., & Reardon, T. (2003). The rise of supermarkets in Africa: implications for agrifood systems and the rural poor. Development policy review, 21(3), 333-355

Appendix

Figure A1: IE Design for Productive Alliances (PA)

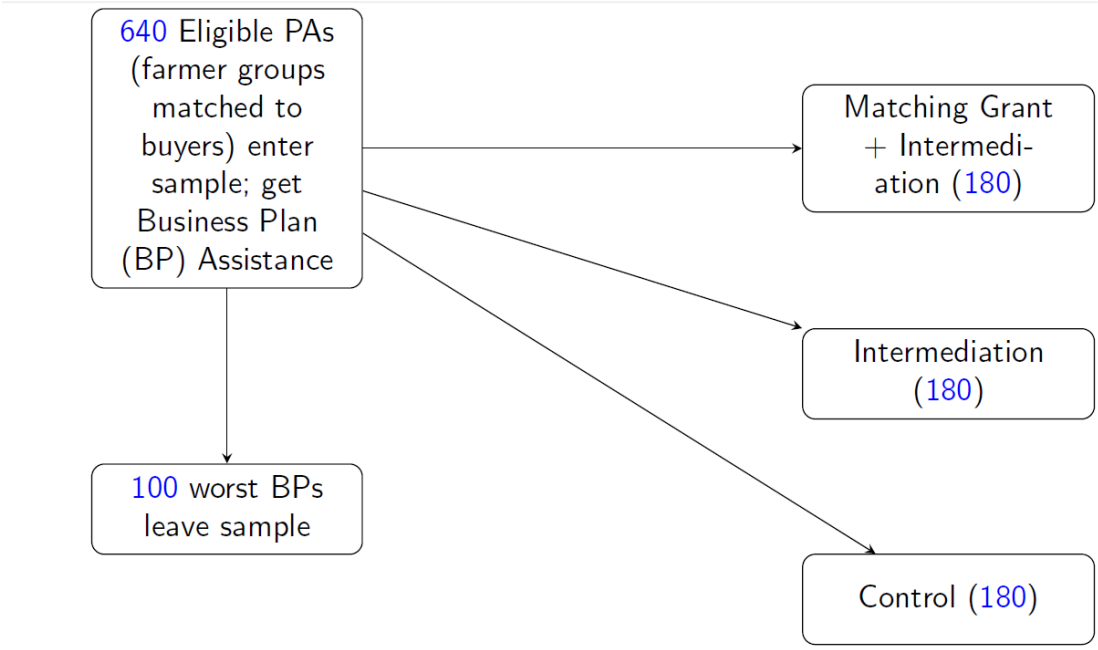


Figure A2: IE Design for Market Connect

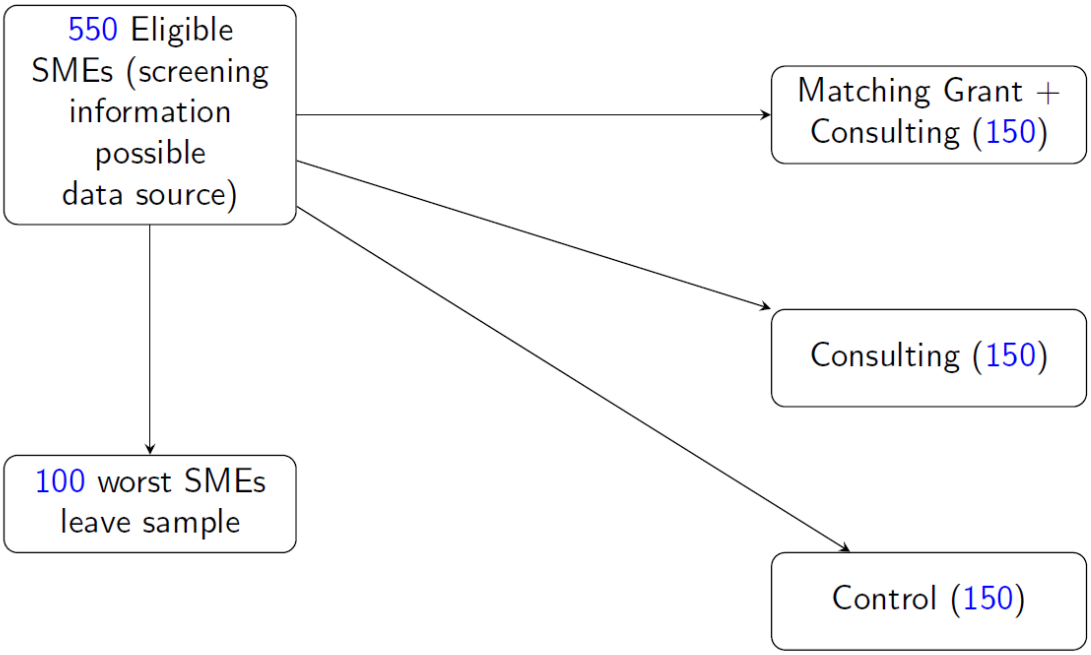


Table A1: Outcomes of interest

Outcome for Farmer groups/SME	Time Horizon	Outcome	Possible Data Indicators
Both	Medium Run	Contract Fulfilment and Renewal	Whether the contract was fulfilled (both seller and buyer will be surveyed), any delays/issues in contract fulfillment, whether contract renewed, specifications of the renewed contract
Both		Managerial/other productivity enhancing practices	Changes to production practices (data collection will be based on recommended best practices)
Both		Contract specific investment aimed at improving productivity	Whether the suppliers undertook investments (e.g. cultivating crops of a certain quality demanded by the buyer by farmers, purchasing certain types of machinery for buyers by SMEs)
Both		Reduction in costs/Increase in markup	For each product produced and/or sold, costs and prices will allow us to compute any changes in cost per unit, as well as markups per unit separately charged by the supplier to each buyer
Both		Changes in product mix	Quality upgradation, product diversification and change (allows testing of whether low value products dropped and high value products added)
Both		Spillovers (if any) on competitors/other buyers	Prices and demand in markets that farmers/SMEs usually sell in
Both	Long Run	Increased Sales, employment	Employment in the short-run and long-run, product-wise sales
Both		Higher revenue, profitability, productivity	Product-wise revenue profitability, and productivity (productivity estimated via production function estimation methods)
Both		Improved market access, reduced transaction challenges	Number of contracts, product-wise and market-wise supply
Both		Improved reputation amongst buyers and retailers	Survey responses by buyers on supplier's reliability and perceived quality
Both		Spillovers (if any) on competitors/other buyers	Prices and demand in markets that farmers/SMEs usually sell in
Individual farmers		Welfare effect	Changes in income, consumption expenditures, food security, asset ownership, etc.

Table A2

Team Composition				
Bank Staff				
Name	**Role**	**Title**	**Specialization**	**Unit**
Brian G. Mtonya	Team Leader (ADM Responsible)	Senior Private Sector Specialist	Trade and Competiveness Specialist	GTC13
Tugba Gurcanlar	Team Leader	Senior Private Sector Specialist	Trade and Competiveness Specialist	GTC13
Wedex Ilunga	Procurement Specialist (ADM Responsible)	Senior Procurement Specialist	Procurement	GGO01
Lingson Chikoti	Financial Management Specialist	Consultant	Financial Management	GGO13
Alex Mwanakasale	Team Member	Sr Agricultural Spec.	Agriculture Specialist	GFA13
Ankur Huria	Team Member	Senior Private Sector Specialist	Trade Logistics	GTCTC
Barbara Weber	Team Member	Senior Operations Officer	Operations	GTC07
Chiluba Mercy Munoni	Team Member	Consultant	Operations	AFMZM
Chris Parel	Team Member	Consultant	DLI Consultant	GTCDR
Chrissie Kamwendo	Team Member	Senior Operations Officer	Operations	AFMZM
David Tuchschneider	Team Member	Senior Rural Development Specialist	Productive Alliance Specialist	GFA04
Dino Leonardo Merotto	Team Member	Lead Economist	Jobs	GPSJB

Eddie Spencer Keturakis	Team Member	Senior Private Sector Specialist	Agribusiness Specialist	GTCCS
Ellen Olafsen	Team Member	Senior Private Sector Specialist	Entreprenuership	GTCID
Gebisa Katambo Nyirenda Chisanga	Team Member	Team Assistant	Team Assistant	CAFZM
Gregory Smith	Team Member	Senior Economist	Economist	GMF13
Henry Sichembe	Team Member	Consultant	Agribusiness	GPSJB
John C. Keyser	Team Member	Consultant	Agriculture Trade specialist	GTC13
John Gabriel Goddard	Team Member	Lead Economist	Economist	GTC13
Justin Runji	Team Member	Sr Transport. Spec.	Infrastructure/Transport Specialist	GTI07
Loraine Ronchi	Team Member	Lead Economist	Agribusiness Lead	GTCCS
Maiada Mahmoud Abdel Fattah Kassem	Team Member	Finance Officer	Finance Officer	WFALA
Majbritt Fiil-Flynn	Safeguards Specialist	Consultant	Social Safeguards Specialist	GSU07
Margaret Png	Team Member	Lead Counsel	Lawyer	LEGAM
Mukayi Tinotenda Musarurwa	Team Member	Consultant	NQI Consultant	GTC13
Mwansa Lukwesa	Safeguards Specialist	Environmental Specialist	Environmental Specialist	GEN01
Nermeen Abdel Latif	Team Member	Results Measurement Specialist	Results Measurement	CBCD3
Paula F. Lytle	Safeguards Specialist	Senior Social Development Specialist	Social Safeguards	GSU07

Peter Nuamah	Team Member	Senior Private Sector Specialist	Investment Climate reforms	GTCA2
Puja Guha	Team Member	Consultant	Operations	GTC04
Roy Parizat	Team Member	Senior Economist	Economist	GFAGE
Sudha Bala Krishnan	Team Member	Results Measurement Specialist	Results Measurement Specialist	GSPJB
Tanangachi Ngwira	Team Member	Analyst	Operations	GTC07
Tania Priscilla Begazo Gomez	Team Member	Senior Economist	Competition Specialist	GTCTC
Wilhelmus Gerardus Janssen	Team Member	Lead Agriculture Economist	Agriculture Economist	GFA13
Zano Mataruka	Team Member	Senior Investment Officer	IFC Investment	CMGA6
Zhihua Zeng	Team Member	Senior Economist	SEZ Design and Policy	GTC01