Factors Influencing Smallholder Bean and Cowpea Producers' Market Participation in Zambia

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ZAMBIAN PULSE CROPS
VALUE CHAIN
INITIATIVE

Background

- Beans and cowpeas are important crops in sub-Saharan Africa because of their nutritional value and income potential.
- Africa produces about 64% of the world's cowpeas, estimated at 7.6 million metric tons per annum (AATF, 2009).
- The majority of Africa's production occurs in West and Central Africa, but southern Africa is becoming an important production area.
- Despite being promoted in Zambia for many years, these crops remain a small portion of the smallholder producers' portfolio.
- Market participation has been found to be an important variable in the transformation of subsistence agricultural crops into commercial crops to help address the poverty and income challenges that confront many smallholder producers (Alene et al. 2008, 318-328).
- Alene et al.'s study shows that certain non-market factors, such as institutional factors, can influence market participation more than prices.

Research Objective

This research identifies smallholder bean and cowpea producer characteristics that influence market participation in Zambia.

The specific objectives are to:
1. Determine the market participate rate for smallholder bean and cowpea producers in Zambia
2. Identify the characteristics affecting market participation for mixed bean and cowpea producers
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Data

The study used data from a survey of 1,050 smallholder bean and cowpea producers conducted between November 2011 and February 2012. The sample was selected through a stratified two-stage cluster sampling regime. After stringent data cleaning, a total of 1,000 respondents were used in the analysis.

References:
Alene, A.D., V. M. Manyong, G. Omanya, H. D. Mignouna, M. Bokanga, and G. Odhiambo. 2008. "Smallholder Market Participation Under Transactions Costs: Maize Supply and Fertilizer Demand in Kenya." Food Policy. 33 (4): 318-328.

(AATF) African Agricultural Technology Foundation "Nigeria to carry out first confined field trials (CFT) for transgenic cowpea in Africa." Partnerships. No. 03, July –Sept. 2009.

Model

A logistic regression model is used to determine the probability of different household characteristics influencing market participation decisions. The generic model is expressed as follows:

$$\theta_{kj} = \begin{cases} 0 \text{ if } j=0 \\ 1 \text{ if } j=1 \end{cases} = \frac{\exp(\alpha + \sum \beta x_i)}{1 + \exp(\alpha + \sum \beta x_i)}$$

where α is the intercept, β is the coefficient of the predictor variables and θ_j is the node choice, where $j=1$ implies the node is selected by the decision-maker and is zero if it is not. The alternative nodes, k, are Consumer, Retailer, Traders and Institutions.

The bean and cowpea supply chain encompasses producers selling directly to wholesalers, retailers and consumers, and wholesalers selling directly to distributors, retailers and institutions.
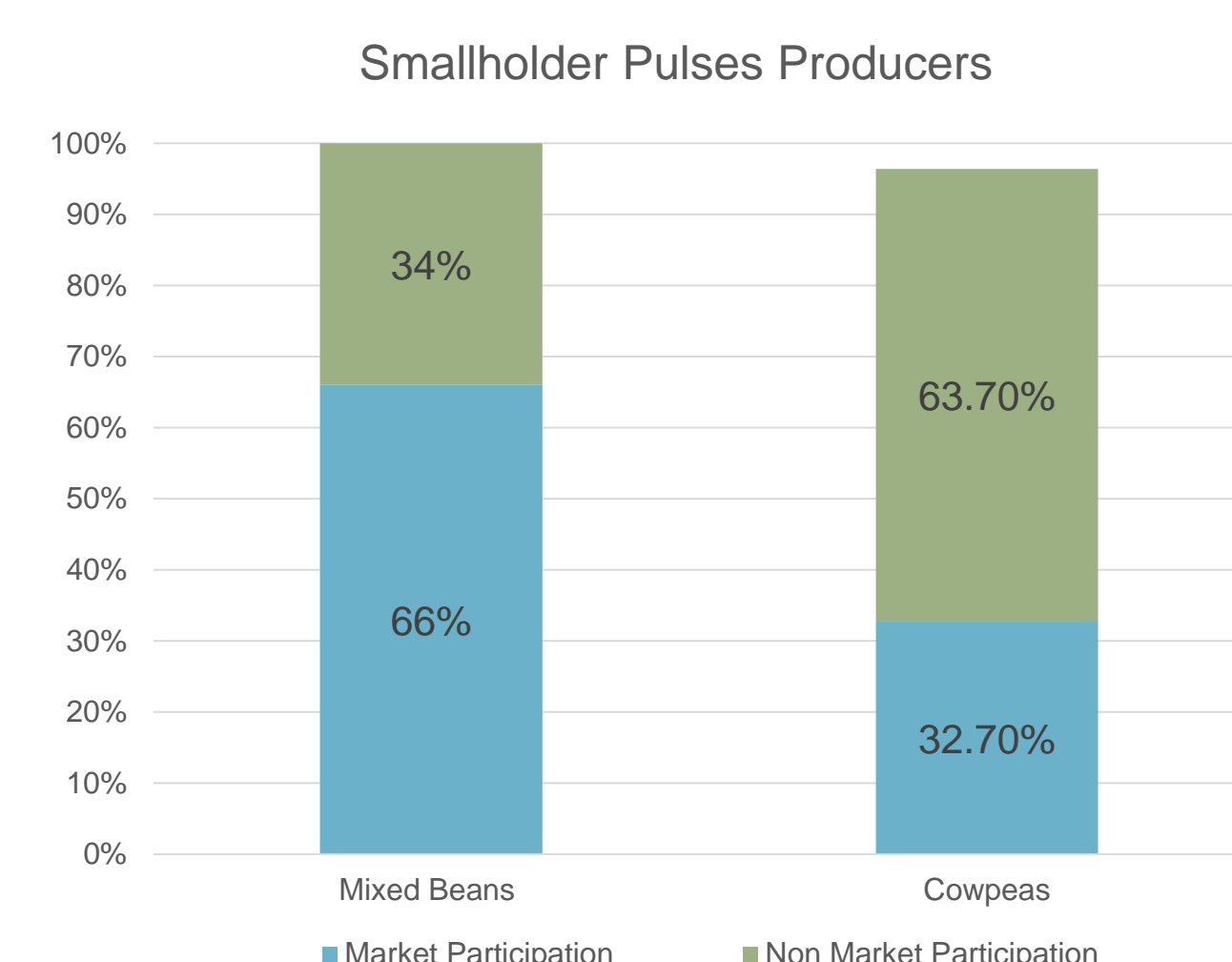
Institutions are defined to encompass end-users such as hospitals, military, schools and hotels and restaurants. Both wholesalers and distributors may operate in the local and/or the international market. Some wholesalers may also operate as retailers, selling directly to consumers.

Figure 1: Bean and Cowpea Supply Chain

Producers → Consumers ↔ Retailers ↔ Wholesalers → Institutions
Wholesalers → Distributors → Institutions
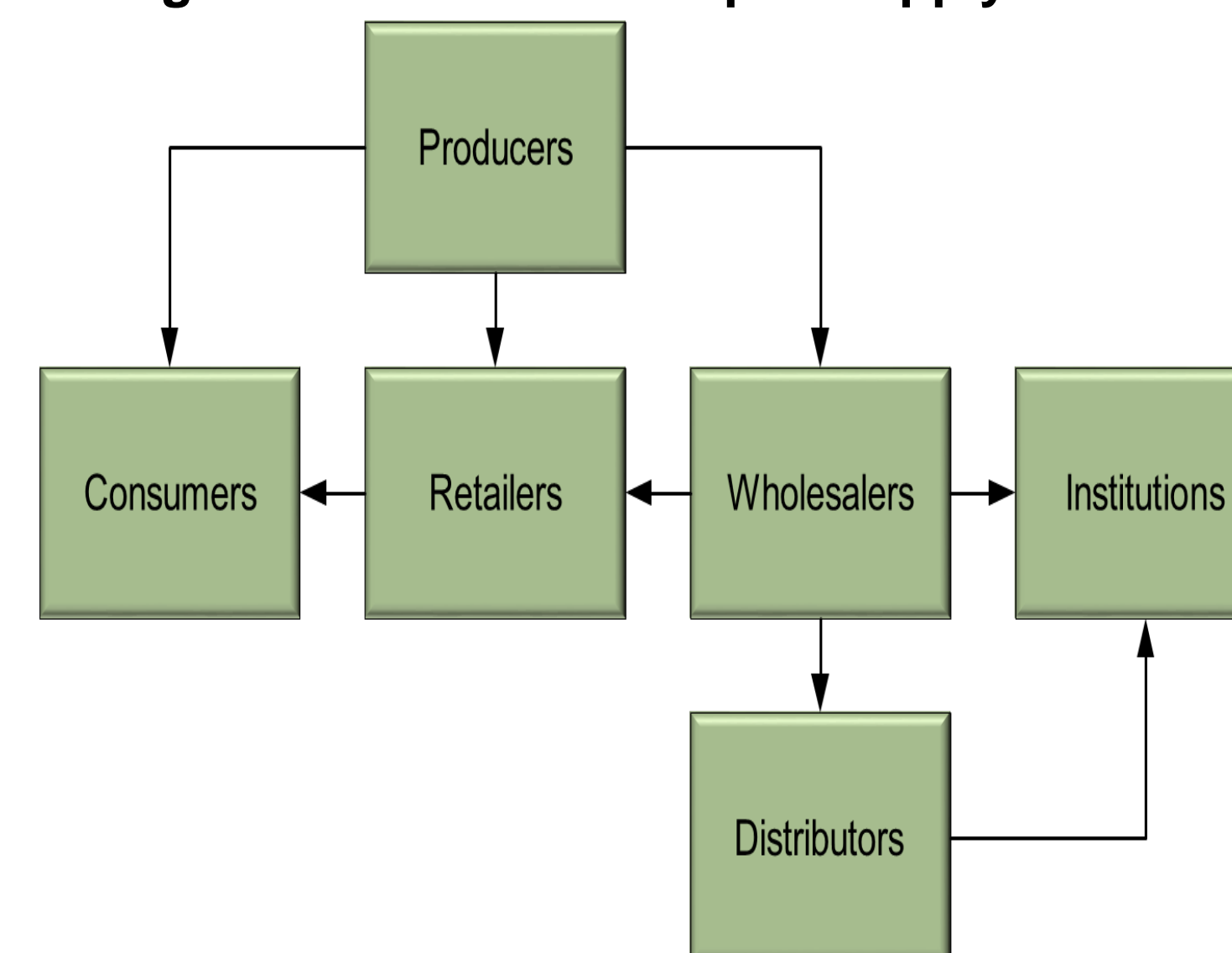
Selected Results

Figure 2: Market Participation Rate

Smallholder Pulses Producers

- Mixed Beans: Market Participation 66%, Non Market Participation 34%
- Cowpeas: Market Participation 32.70%, Non Market Participation 63.70%

- Non Market Participation indicates that the crops were used for home consumption, gifts, seed, and in-kind payment for goods and services.
- There is no statistically significant differences between males and females in market participation of both crops.

Selected Results

Table 1: Elasticity Results for Mixed Bean Market Participants by Node

Variables	Consumers	Retailers	Traders	Institutions
Gender	-0.10	0.03	-0.13**	0.01
Education	0.22	-0.43*	-0.11	0.15
Southern	0.10	-0.88***	-1.13***	-0.37*
Northern	0.29**	0.10	-0.01	0.88***
Cropland	-0.53***	-0.08	-0.06	0.12
Bean Share (%)	0.24***	0.02	0.23***	0.180*
F-value	3.93	3.26	6.11	17.70
Prob > F	0	0	0	0

Level of significance is denoted by asterisks:
* ≤ 0.10,
** ≤ 0.05 and
*** ≤ 0.01 level of significance, respectively.

Table 2: Elasticity Results for Cowpea Market Participants by Node

Variables	Consumers	Retailers	Traders	Institutions
Gender	-0.23**	0.12**	-0.05	0.02
Education	0.39	-0.53	0.10	0.07
Southern	0.14*	-0.39***		-0.10
Northern	-0.54**	-1.16**	-1.77***	-0.40
Cropland	-0.24	-0.57	-0.2	0.52**
Cowpea Share (%)	0.12	0.22**	0.13***	0.21*
F-value	4.87	5.96	13.07	4.62
Prob > F	0	0	0	0

Key Findings

- For bean producers, all node choices exhibit inelastic responses to all variables except for Southern Province location.
- Total cropland does not influence market participation at any node except for institutions in the cowpea market and consumers in the bean market.
- There is a lower probability of selling beans to traders if producer is located in Southern Province, and a higher probability of selling beans to institutions if located in Northern Province compared to Eastern Province.
- There is a higher probability of selling cowpeas to consumers if producer is located in Southern Province and a lower probability of selling cowpeas to consumers, retailers, and institutions if located in Northern Province compared to Eastern Province.
- Education is not a significant factor for selling to different nodes in the bean and cowpea markets except for selling beans to retailers.
- Compared to males, females have a lower probability of selling beans to traders and cowpeas to consumers, but they have a higher probability of selling to retailers.

Implications

- Participation in the more lucrative institutional market would require producers to increase their critical production level, demanding new governance systems such as co-ops and strategic alliances .
- Geographical location of smallholder producers has a larger impact on market participation than gender and education.
- Future research may explain the inconsistency of influencing factors in the bean and cowpea markets.