Asian Journal of Business Management 6(2): 97-103, 2014
ISSN: 2041-8744; e-ISSN: 2041-8752

Submitted: November 20, 2013 Accepted: December 17, 2013 Published: May 15, 2014

Determinants of Smallholder Pulse Producers Market Orientation in Southern Ethiopia

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Abstract: Pulse crops production and factors influencing the intensity market orientation were conducted in selected districts of southern Ethiopia. A total of 183 farmers were selected randomly and interviewed using structured schedule. The finding reveals that 73% of households produce haricot beans in the study areas on about 17.2% of total cultivated land. Out of the total produce of haricot bean close to 56% were sold. Next to haricot bean, chickpea is important pulse crop and is produced by 26.8% of the households. About 69.5% of total chickpea produce was sold indicating that chickpea is an even more important cash crop. The average level of market orientation index for haricot bean was 0.4 while that of chickpea 0.53, indicating moderate level of households market orientation. The Tobit estimation result show that household head education level, access to credit and land per capita positively influenced chickpea market orientation while being male head of a household and accesses to credit increased the predicted value of haricot bean market orientation. The key implication of this study is that interventions aimed at promoting market orientation of pulse crops should promote smallholder access to credit, human capital development and women empowerment.

Keywords: Market orientation, pulses, smallholders, tobit

INTRODUCTION

Pulse crops are important components of crop production in developing countries and a vital crop for achieving food, nutritional and income security of smallholders. The important and diverse role played by pulses in the farming systems and in diets of poor people, makes them ideal crops for achieving the developing countries government goals of reducing poverty and hunger, improving human health and nutrition and enhancing ecosystem resilience. On average, pulses contribute about 3% of total calories consumed in developing countries, ranging from 4% in Sub Saharan Africa (SSA) to less than 1% in Central Asia (Sitou and Mywish, 2011).

Food pulses s (faba bean, field pea, chickpea, haricot bean and lentil, also called legumes) occupy about 13% of the croplands in Ethiopia and they are the second most important element in the national diet, providing a principal protein source. They are also an important dietary supplement to cereal consumption. Pulses are used primarily for making an Ethiopian stew known as wot, which is sometimes served as a main dish to be eaten with injera. Faba bean, field pea, chickpea and lentil widely grow in the highlands while haricot bean is grown in the low and intermediate altitudes. Pulses recently have regained significance as export commodities.

Although pulses have many desirable characteristics in terms of high value crops, rich in nutrition and able to harness environmental benefits, in most parts of Ethiopia they are considered secondary crops. As a secondary crop category, pulses do not receive investment resources and policy attention as do the cereal crops, which are often, considered food security crops. Studies have shown that pulses on an average contribute 15% of total protein intake, account for 13% of the cultivated land and 8.5% of the total crop production in Ethiopia (Chilot *et al*., 2010). In recent years the pulse sector shows a steady increase in productivity and total volume of production. Recently the government of Ethiopia made strides to transform the subsistence smallholder agriculture to commercial oriented one. To this effect pulses are considered as the critical pathway for transforming the subsistence agriculture into commercial oriented agriculture. In spite of the policy decision, there is a dearth of information on the commercialization process and marketing behavior of smallholder[1] pulse crop producers in Ethiopia.

According to Sheppared (2011) market orientation is defined as a sequence of information based behaviors and a culture of customer and competitor orientations and inter-functional co-ordination. It states that market orientation requires full knowledge of the market concept and practices, understanding the behavior and possible actions of rivals and commitment to serve the need and the wants of customers. The market orientation of smallholders is divergent from what is established to examine market orientation of firms. Traditionally smallholder farmers primarily produce for their substance need and sell whatever is surplus. Such

marketing practices of smallholders fall short of the market orientation concept.

For many years research on market orientation has shaped marketing thinking and business operations of firms (Helfert *et al*., 2001). Many studies illustrate the predominant view that developing a market orientation is positively associated with superior performance for the firm (Kirca *et al*., 2005). Empirical research findings show that market orientation is positively related to: profitability (Narver and Slater, 1990); new product development and success (Atuahene-Gima, 1995); sales growth (Greenley, 1995); increased sales revenue and higher levels of employee satisfaction, commitment and trust (Jaworski and Kohli, 1993); and, customer service and retention (Narver and Slater, 1993).

The overwhelming volume of literature on market orientation has dealt with the manufacturing sector (Narver and Slater, 1993; Helfert *et al*., 2001). However, research examining the importance of a market orientation within food industry and retailing chains has recently shown up (Harris and Piercy, 1999). It is somewhat surprising that within the food value chain, the importance of a market orientation has been examined for all other segments except producers (farmers). More recently literature is emerging on market orientation of smallholding farmers (Gebremedhin and Jaleta, 2012; Wolday, 1994).

According to Gebremedhin and Jaleta (2012) household subsistence requirements, market access and production factors (land, labor and capital) affect market orientation of smallholder farmers in Ethiopia. An earlier study from Ethiopia reported that landholding size and land slope, irrigation use, number of oxen owned and membership in extension package program have positive and significant associations with market orientation and commercialization (Goitom, 2009). These researches are mainly focusing on cereals and there is a gap in knowledge in the determinants of pulse crops market orientation.

This study attempts to contribute to redressing this gap of knowledge for the major pulse crops of haricot bean and chickpea. Data for the study were collected from Canadian International Food Security Research Fund CIFSRF project districts where these crops are important market oriented commodities and promoted through the project. Analysis of the variation in market orientation of households in these crops in areas where the crops are important source of cash income offers a unique opportunity to gain insight into the determinants of market orientation.

MATERIALS AND METHODS

Study area and sampling procedure: The present survey was conducted from early July to end of August, 2012 in three project sites namely Huletegna Choroko, Taba and Jole Andegna (see Map of the study area). Multistage sampling procedures were employed to select village and farmers. In the first stage, project sites were selected purposively and from each site three pulse growing villages were selected. In the second stage from the selected three villages per project site between 56 to 65 farmers were selected randomly. Finally, a total of 183 farmers were selected for personal interview. The survey questionnaire was administered by trained and qualified enumerators after they learned the content of the questionnaire and survey administration (Fig. 1).

Empirical procedure:

Market Orientation Index (MOI): Smallholder market orientation is conceptualized from the point of market participation (selling marketable surplus) and the extent of product sale (volume of sales). According to Gebremedhin and Jaleta (2010) a smallholder is market oriented if its production plan follows market signals and produce commodities that are more demanded by market actors. This means the producers address the three basic economics questions: what to produce, how much to produce and for whom to produce. This entails a shift from subsistence to market oriented production systems.

Under a subsistence orientation, where production, consumption and marketing decisions are inseparable, all crops produced by a household may not be marketable in the same proportion. This is because the prime objective of subsistence producers is to fulfill subsistence requirements and production decisions are made based on agro-ecological feasibility and subsistence needs. In this case, producers attempt to sell whatever surplus they might have upon fulfillment of subsistence needs.

This study adopted the methodology developed by Gebremedhin and Jaleta (2010), to examine smallholder market orientation in Ethiopia. First the crop specific index was calculated and using this index as a proxy for the farming system, household specific market orientation is calculated for crops which are the interest of this study. Hence, a crop specific marketability index (ϕ_k) is computed for each crop produced at farming system level as follows Eq. (1):

$$\phi_k = \frac{\sum_{i=1}^{N} S_{ki}}{\sum_{i=1}^{N} Q_{ki}} \quad (1)$$

where, ϕ_k is the proportion of crop k sold (S_{ki}) to the total amount produced (Q_{ki}) aggregated over the total sample households in a farming system. ϕ_k takes a value between 0 and 1, inclusive. Crops mainly produced for markets usually have ϕ_k values closer to 1.

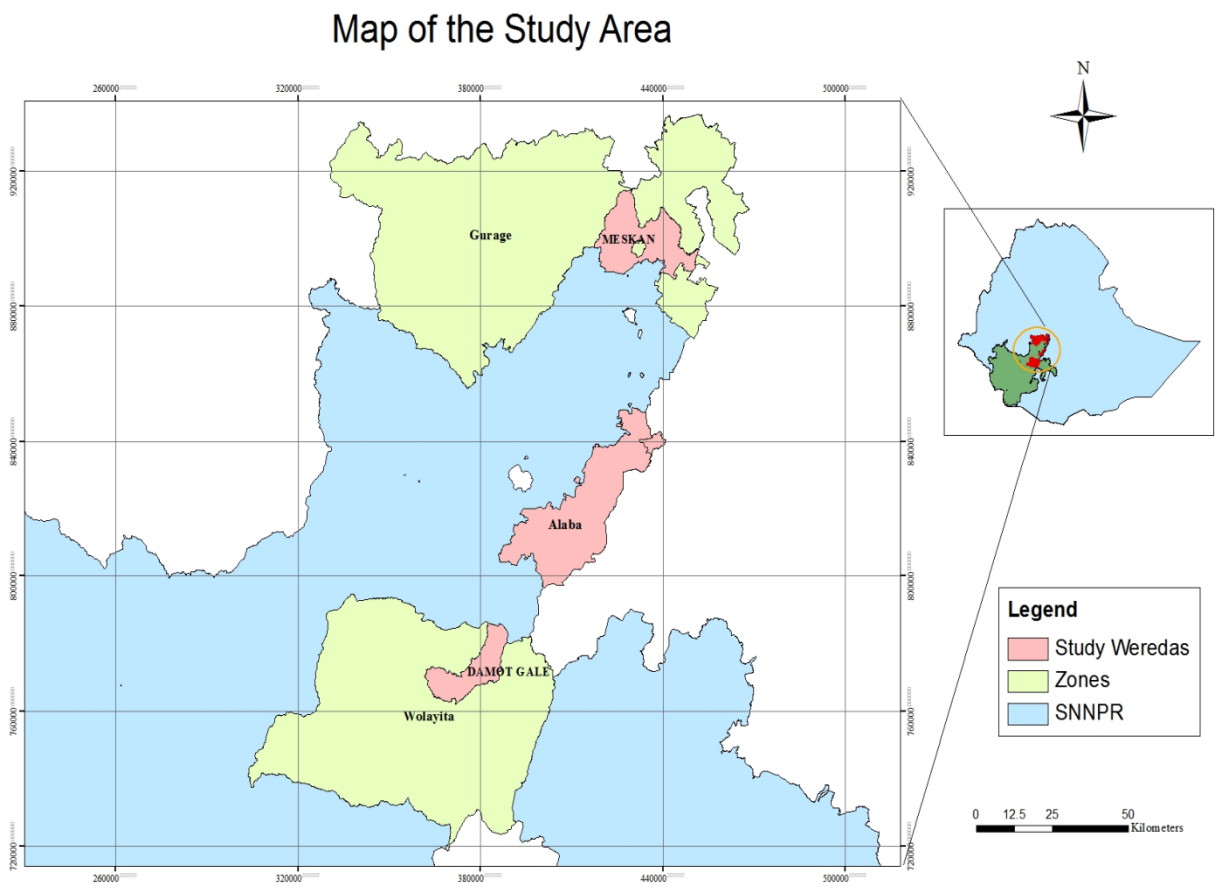

Fig. 1: Map of the study area

Once the crop specific marketability index is computed, household's Market Orientation Index (MOI_i) is computed from the land allocation pattern of the household weighted by the marketability index of each crop (ϕ_k) derived from Eq. (2) as follows:

$$MOI_i = \frac{\sum_{i=1}^{N} \phi_k L_{ik}}{L_i^T} \quad (2)$$

where, MOI_i is market orientation index of household i; L_{ik} is amount of land allocated to crop k and L_i^T is the total crop land operated by household i. The higher proportion of land a household allocates to the more marketable crops, the more the household is market oriented.

Econometric model: Following Maddala (1992), the Tobit model for the continuous variable market orientation index was employed. Unlike logit and probit which is used when dependent variables of interest take only two values (a dichotomous variable), denoting an event or non-event, tobit model handle limited response dependent variable like market orientation which range between 0 and 1. The tobit model used in this study is defined as:

$$\begin{aligned} y_i^* &= \beta_o + \beta_i x_i + \mu_i \\ y_i &= y_i^* \; if \; \beta_o + \beta_i x_i + \mu_i > 0 \\ &= 0 \; if \; \beta_o + \beta_i x_i + \mu_i \le 0 \end{aligned} \quad (3)$$

where,

y_i = Market orientation index for i^{th} farmer

y_i^* = The latent variable and the solution to utility maximization problem of intensity of market orientation subjected to a set of constraints per household and conditional on being above certain limit

x_i = Vector of factors affecting intensity or level of market orientation

β_i = Vector of unknown parameters

μ_i = The error term which is normally distributed with mean 0 and variance σ

The model parameters are estimated by maximizing the Tobit likelihood function of the following form (Maddala, 1997; Amemiya, 1985):

$$L = \prod \frac{1}{\sigma} \; f\left(\frac{AIi \; -\beta i \; X i}{\sigma}\right) \prod F\left(\frac{-\beta i \; X i}{\sigma}\right) \qquad (4)$$

AIi *.>0 AIi *≤.0

where, f and F are, respectively, the density function and cumulative distribution function of Y_i*.$\prod$ means the product over those i for which $Y_i \leq 0$ and $\prod$ which $Y_i^* \leq 0$ Y_i *.>0 means the product over those i for which $Y_i^* > 0$.

Econometric software STATA was employed to run the Tobit model. According to Johnston and Dinardo (1997), it may not be accurate to interpret the coefficients of a Tobit in the same way as one interprets coefficients in an uncensored linear model. Hence, one has to compute the derivatives of the estimated Tobit model to predict the effects of changes in the explanatory variables.

Before running the Tobit model all the hypothesized explanatory variables were checked for the existence of multicollinearity problem. There are two measures that are often suggested to test the existence of mulitcollinearity. These are: Variance Inflation Factor (VIF) for association among the continuous explanatory variables and contingency coefficients for dummy variables. In this study, Variance Inflation Factor (VIF) and contingency coefficients were used to test multicollinearity problem for continuous and dummy variables respectively.

RESULTS AND DISCUSSION

Pulse crop production and contribution to household income: Haricot bean is an important component of the farming system in project sites. About 73% of households produced haricot beans in the study areas on about 17.2% of total cultivated land. A household allocated about a quarter of a hectare of land for haricot bean production. About 56% of haricot bean production was sold, suggesting that haricot bean was also an important component of the household cash generation. On average a household sold about 185 kg of haricot bean for a sales value of about 1022 birr[2]. The proportion of haricot bean sold was more unevenly distributed by the proportion of households selling. About 33% of households sold only 26-50% of their produce, while about 32% sold 76-100% of their produce. The rest 35% of the households sold less than 25% of haricot bean. In the project sites, chickpea was produced by about 26.8% of the households, on about 16.8% of the total cultivated area **(**Table 1). On average a household allocated about 0.26 ha of land for chickpea. A household also sold about 242 kg of chickpea, about 69.5% of total chickpea produce for total revenue of 1760.6 birr. The mode in the proportion of chickpea produce sold ranged between 33 and 100%.

Table 1: Haricot bean and chickpea production and income contribution in the study area farming

Haricot bean and chickpea production and contribution to household income	Pulse crops	
	Haricot bean	Chickpea
Proportion of households producing crop (%)	72.70%	26.20%
Proportion of area covered by crop (%) /average holding	17.20%	16.80%
Area allocated (ha/household)	0.27 ha	0.26 ha
Proportion of produce sold (%) /household	56%	69.50%
Amount sold (qt)	1.85	2.42
Average revenue/household (ETB)	1022.22	1760.60

Own survey (2012)

Table 2: Haricot bean and chickpea market orientation

Degree of market orientation	Haricot bean	Chickpea
0.01-0.25	31.50%	18%
0.25-0.50	42.86%	30%
0.50-0.75	17.29%	28%
>0.75	8.27%	24%
Average market orientation (Mean, CV)	0.40 (0.59)	0.53 (0.49)

Own survey (2012)

Market orientation of haricot bean and chickpea: The investigation of the degree of market orientation of the two major pulse crops in the study area revealed that the households' degree of market orientation was less to haricot bean than chickpea. The average level of market orientation index for haricot bean was 0.4 while that of chickpea 0.53, indicating moderate level of households market orientation (Table 2). The coefficient of variation 59% for haricot bean and 49% for chickpea indicates that there is huge variation among smallholders in their market orientation. Close to 31.5% of haricot bean producers had insufficient guidance of the market compared to only 18% chickpea producers. Those who had good and greater market orientation had accounted for 26% of haricot bean producers while the proportion was raised to 52% for chickpea producers.

Descriptive statistics of variables used in the tobit regression analysis: Determinants of market orientation used in this study can be categorized as human capital (age, sex, education, household head) resource endowment (labor supply, land TLU, expense for fertilizer), access to market information and access to institutional factors (credit and market information). Studies done on market orientation of different agricultural commodities in Ethiopia had used similar variables (Gebremedhin and Jaleta, 2012; Goitom, 2009). But in this study natural factors such as rainfall and agro-ecology were omitted because of data limitation.

About 15% of households in the sample were female headed. The prevailing education of household head was basic literacy and elementary level education.

Table 3: Descriptive statistics of variables used in the model

Variable	Obs.	Mean	S.D.	Min.	Max.
Sex of household head (1 = male, 0 = female)	183	0.85	0.36	0	1
Education of household head	183	1.97	1.06	1	5
Market information (1 = yes, 0 = no)	183	0.82	0.39	0	1
Family size (no.)	183	6.97	2.93	2	26
Access to credit (1 = yes, 0 = no)	182	0.20	0.40	0	1
Age of household head (year)	183	40.74	11.87	18	76
Fertilizer expense (birr)	183	59.36	135.07	0.00	1050.00
Tropical livestock unit (no.)	183	3.19	3.10	0.00	35.59
Landholding size (ha.)	183	1.47	1.27	0.25	8.88
Land per capita (ha)	183	0.23	0.19	0.03	1.41

Own survey (2012)

The average household size was about 6.9, with family labour supply of 4.3 persons/household, figures which are close to the national average. The average age of typical household in this study was 41 years. While the overwhelming majority of the respondents confirmed their access to market information (82%), only 20% acknowledged having access to credit service. A household on average operated about 1.47 ha, with an average per capita landholding of 0.23 ha. The average fertilizer value used for annual haricot bean and chickpea production was 59.40 birr, which indicates low level of fertilizer application (Table 3).

Determinates of market orientation:

Chickpea: Table 3 shows the estimation results of the Tobit model. Seven variables were significant in explaining the market orientation of chickpea in the project area. The χ^2 was highly significant at 1% level of probability indicating goodness of fit. The coefficients of household head education level, access to credit and land per capita were positive and significant at 10% level of probability. This implies that increases in these variables will lead to increases in the level of chickpea market orientation. On the other hand household head sex and fertilizer expense were negative and significant at 10 and 5% level of probability, respectively. This finding indicates that female head of households have, by 0.331 a reduction in the chickpea market orientation compared to their male head of a household counterpart, while increases in fertilizer expense by a birr reduces the chickpea market orientation (Table 4). In other words farmers who use fertilizer are less interested to cultivate chickpea.

The predicted value of chickpea market orientation is 0.972 points higher for Taba chickpea producers than for chickpea producers in Huletegna Choroko. Similarly the coefficient 1.1 indicates that market orientation of chickpea in Jole Andegna is 1.1 points higher than Huletegna Choroko. The finding indicates that chickpea producers in Taba and Jole Andegna are significantly market oriented than Huletegna Choroko chickpea producers and the difference is statistically different at less than 1% level.

Haricot bean: The Tobit estimation indicates that being male head of a household and access to credit increased the predicted value of haricot bean market orientation by a factor of 0.239 and 0.207, respectively and the result was statistically significant at less than 1% probability level. Land holding, TLU and age of the respondents were negatively related with haricot bean market orientation. The finding implies that one year increase in age of respondent, a unit increase in TLU and an increase in land holding by a hectare decrease the predicted value of market orientation by 0.01, 0.08 and 0.07, respectively. A one birr increase in fertilizer

Table 4: Tobit model estimates of factors affecting chickpea market orientation

Chickpea market orientation index	Coef.	S.E.	t
Household head sex	-0.331	0.184	-1.79*
Household head education level	0.112	0.067	1.64*
Market information	0.224	0.183	1.25
Access to credit	0.279	0.155	1.80*
Household head age	0.016	0.032	0.50
Land per capita	0.992	0.524	1.89*
Fertilizer expense	-0.002	0.001	-2.01**
Tropical livestock unit	0.034	0.037	0.92
Taba	0.972	0.257	3.78***
Jole andegna	1.082	0.238	4.54***
_cons	-1.614	0.404	-3.99***
	0.598	0.072	
χ^2	0.000***		
Log likelihood	-82.250		
Total sample	180		

Own survey (2012); Hultegna Choroko is base project site; ***, **, * are significant at 1%, 5% and 10% respectively

Table 5: Tobit model estimation of haricot bean market orientation

Haricot bean market orientation index	Coef.	S.E.	t
Household head sex	0.239	0.08	2.67***
Household head education level	-0.030	0.03	-1.08
Market information	0.040	0.07	0.63
Family size	0.018	0.01	1.60
Access to credit	0.207	0.07	3.09***
Household head age	-0.010	0.00	-1.70*
Landholding size	-0.070	0.03	-1.78*
Fertilizer expense	0.034	0.00	1.96*
TLU	-0.080	0.04	-1.92*
Taba	-0.240	0.07	-3.41***
Jole andegna	-0.580	0.07	-8.30***
_cons	0.560	0.14	3.94***
χ^2	0.000***		
Log likelihood	-31.210		
Total sample	135		

Own survey; Hultegna Choroko is base project site; ***, **, * are significant at 1%, 5% and 10% respectively

expense increased the market orientation of haricot bean by 0.034 (Table 5).

The predicted value of haricot bean market orientation was -0.24 points lower for Taba respondents than for respondents in Huletegna Choroko. Similarly the coefficient -0.58 indicates that market orientation of haricot bean in Jole Andegna was 0.58 points lower than Huletegna Choroko. This implies that that haricot bean producer in Taba and Jole Andegna were significantly less market oriented than Huletegna Choroko respondents and the difference was statistically significant at 1% probability level.

CONCLUSION

Haricot bean and chickpea are important market-oriented commodities in project sites. About 73% of households produce haricot beans in the study areas on about 17.2% of total cultivated land. Close to 56% of haricot bean produced is sold, suggesting that haricot bean is an important component of the household cash source. About 33% of households sold only 26-50% of their produce, while about 32% sold 76-100% of their produce. Chickpea is a high value crop produced by 26.8% of the households on about 16.8% of the total cultivated area. On average a household allocates about 0.26 ha of land for chickpea. A household also sold about 242 kg of chickpea for total revenue of 1760.60 birr. The proportion of chickpea produce sold ranged between 33 and 100%.

The average level of market orientation index for haricot bean was 0.4 while that of chickpea 0.53, indicating moderate level of households market orientation. The coefficient of variation indicates that there is huge variation among smallholders in their market orientation. Close to 31.5% of haricot bean producers had insufficient guidance of the market compared to only 18% chickpea producers.

The Tobit estimation result shows that household head education level, access to credit and land per capita positively influenced chickpea market orientation. On the other hand household head sex and fertilizer expense were negatively associated. The finding indicates that female headed households are more likely to engage in chickpea production. The Tobit estimation of haricot bean indicates that being male head of a household and access to credit increase the predicted value of haricot bean market orientation by a factor of 0.239 and 0.207, respectively. Land holding, TLU and age of the respondents are negatively related with haricot bean market orientation.

There is need to focus attention on improving haricot bean and chickpea market orientation among rural households. This is because close to 56% of haricot bean and 69.5% of total chickpea production is sold, suggesting that both pulse crops are an important component of the household cash source. The key implication of this study is that interventions aimed at promoting market orientation of pulse crops should promote smallholder access to credit, human capital development and women empowerment and create awareness on the nutrition value of pulse crops.

ACKNOWLEDGMENT

The author is grateful to the financial support he received form CIFSRF project. He also would like to thank Dr. Sheleme Beyene, Dr. Carol Hennery, Dr. Pascal, Dr. Susan and Dr. Atul for their support and encouragement.

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Endnotes:

1: Smallholder is the one with limited land availability, poor-resource endowments, subsistence-oriented and highly vulnerable to risk.

2: Birr is the unit of currency in Ethiopia and 1 US Dollar = 18.9625 Ethiopian Birr in October, 2013.