academicJournals

Vol. 10(18), pp. 451-458, 28 September, 2016
DOI: 10.5897/AJBM2016.8100
Article Number: D1FECB060774
ISSN 1993-8233

http://www.academicjournals.org/AJBM

African Journal of Business Management

Full Length Research Paper

Factors influencing smallholder participation in the pigeon peas market: A case of tete province, Mozambique

David Muronda* and Marian Tukuta

Department of Supply Chain Management, School of Business Sciences, Chinhoyi University of Technology, Zimbabwe.

Received 10 June 2016; Accepted 11 August, 2016

Agricultural market participation in Mozambique has historically been very low. Despite a remarkable increase in pigeon peas production, the factors that influence smallholder participation in pigeon peas markets in Tete Province have remained unknown. The study therefore sought to determine factors that influence smallholder producers' participation in the pigeon peas market using the transaction cost theory. Multi-stage sampling was used to collect data from 73 households through semi-structured questionnaires and logistic and multiple regression models were used to assess factors affecting smallholder participation in the pigeon peas market. Proximity to main market, access to credit, regular attendance of farmer group meetings, trust among group members, age of head of household, household private assets endowment and adequate labour, access to extension services and provision of knowledge on pigeon peas production, and early planting positively influenced smallholders market participation. Time to travel to main market; ratio of active household members; working in other farmers' fields on casual basis; and food security limited smallholders' market participation. The study recommended the implementation of credit access schemes, investment in extension services, setting up of well-equipped village based markets, setting up platforms for regular interaction of producers to build social capital and interventions that enable building of private assets. The increasing importance of pigeon peas merits further research in other locations along the Zambia-Nacala Trade Corridor.

Key words: Smallholder, pigeonpea, factors, market participation, Mozambique.

INTRODUCTION

Smallholder farmers dominate the agricultural sector in most of the developing world. Due to forces of globalization, the majority of the small farmers lack the capacity to compete on the global markets that are normally characterized by strict grading standards (Makoka, 2009). Development agents and policy makers face a challenge of ensuring that smallholder farmers participate in global markets in a way that increases their competitiveness, while at the same time gaining sustainable growth. Market participation is both a cause and a consequence of economic development (Boughton et al., 2007). Markets offer households the opportunity

*Corresponding author. E-mail: davemuronda@gmail.com.

to specialize according to comparative advantage and thereby enjoy welfare gains from trade. Recognition of the potential of markets as engines of economic development and structural transformation gave rise to a market-led paradigm of agricultural development during the 1980s (Reardon and Timmer, 2006) that was accompanied by widespread promotion of market liberalization policy agendas in Sub-Saharan Africa (SSA) and other low-income regions. Furthermore, as households' disposable income increases, so does demand for variety in goods and services, thereby inducing increased demand-side market participation, which further increases the demand for cash and thus supply-side market participation (Boughton et al., 2007). The standard process of agrarian and rural transformation thus involves households' transition from a subsistence mode, where most inputs are provided and most outputs consumed internally, to a market engagement mode, with inputs and products increasingly purchased and sold off the farm (Timmer, 1988; Staatz, 1994).

In Africa, agricultural smallholder producers are the basis for development and they make majority of the population and account for large share of GDP and export earnings (Warner and Campbell, 2000). Small-holder producers in developing countries increasingly seek to participate in global markets. This participation is an important driver of economic and social progress throughout the developing world (Stanton and Burkink, 2008). Smallholder farmers face high transaction costs and uncertainty arising from missing or inefficient input and product markets, high access barriers and costs of information, and other market imperfections that restrict market access (Jones et al., 2002).

Agricultural market participation in Mozambique has historically been very low. Rural smallholder households, who devote most resources to agriculture and draw over two thirds of their income from crop production, are typically subsistence oriented (Benfica and Tschirley, 2012). In recent years, particularly since 2008, prices of major food crops have increased in international markets. Pigeon peas production, a traditional crop in Central and Northern Mozambique, has expanded significantly at an annual rate 8 percent since 2008, faster than any other food crop (Walker et al., 2015). This has made pigeon pea important to the Mozambican smallholder sector, given that even with negligible inputs; it is one of the most stable yielding crops (Walker et al., 2015).

There has been a remarkable increase in production and dedicated commercialization efforts of pigeon peas among them; export and establishment of three pigeon peas processing plants in Zambezia, Beira and Nacala by the Export Trading Group (ETG); International Crops Research Institute for the Semi-Arid Tropics (CRISAT) and National Agricultural Research Center for Mozambique (IIAM) release and promotion of high yielding pigeon peas varieties, and provision of technical services on the benefits of row cropping that establishes the foundations for agricultural intensification (Walker et al., 2015), joint project on promotion of market oriented production of pigeon peas by the Netherlands Development Organization (SNV) and Alliance for a Green Revolution in Africa (AGRA) in Tete Province and setting up of buying centres at Zobue in Moatize District, by buyers such as Olam and Kafaitulah Commercial.

Despite these efforts, the factors that influence participation in pigeon peas market in Tete Province have remained largely unknown. Furthermore, little research has explicitly and systematically explored the transaction cost related factors that influenced participation of smallholder producers in pigeon peas markets in Mozambique. The study sought to determine factors that influence smallholder producers' participation in the pigeon peas market using the transaction cost theory.

METHODOLOGY

The study used primary data that was collected from a sample of 73 farmers in three Districts; Moatize, Angonia and Tsangano of Tete Province in Mozambique. The three districts were selected based on the intensity of pigeon pea production. Simple random sampling was used to select three localities form Moatize District, one locality each from Tsangano and Angonia Districts. The study selected nine villages using simple random sampling. From each selected village, a farmer leader was selected and systematic random sampling was then used to select every second household in a village. Key informants were selected from three localities based on the intensity of pigeon peas production.

Semi-structured questionnaires were used to collect data through structured face to face interviews. The study also used reading (document analysis) as an information gathering method thus several publications and reports were read for the purpose of collecting secondary data.

Data analysis

To identify the transaction cost related factors that affected the quantities of pigeon peas marketed, a multiple regression model was estimated. This type of technique allows for prediction of a score on one variable on the basis of their scores on several other variables. In multiple regressions, more than one variable is used to predict the criterion. To construct the multiple regression models using the Statistical Package for Social Scientists (SPSS), the backward method for selecting explanatory variables was used in the study as recommended by Landau and Everrit (2004). The study also uses logistic regression analysis to predict market participation outcome based on single variable and also to estimate the magnitude and direction of effect of variable.

This study used the chi-squared for a 2 X 2 contingency table test and Fishers' exact test to assess whether there was any association between pigeon peas market participation and some transaction costs related variables. In addition, the study used logistic regression analysis to predict market participation outcome based on single predictor variable and to estimate the magnitude and direction of effect. Variables that were initially found to be significantly associated with market participation based on cross-tabulation results and Fishers' exact test were analysed. The logistic regression model was selected owing to its rigour and strength in predicting outcomes on both continuous and binary

Table 1. Description of variables used in the logistic regression model.

Variable	Type of variable	Explanation of variable
Market participation	Dependent	1 = Participant household, 0 = non-participant household
District	Predictor	1 = Household reside in Moatize District, 0 = Other District
Adequate labour	Predictor	1 = Household had adequate labour, 0 = otherwise
Credit/Loan	Predictor	1 = accessed loan, 0 = otherwise
Frequent group meetings	Predictor	1 = Household attended group meetings more than once a month, 0 = meetings attended less frequently
Group members trust	Predictor	1 = Household trusted group members, 0 = otherwise
Extension service	Predictor	1 = Had access to extension service in the last season, 0 = otherwise

variables (Stoltzfus, 2011).

As postulated by Peng et al. (2012), regression techniques are versatile in their application to research because they can measure associations, predict outcomes, and control for confounding variable effects. As one such technique, logistic regression is an efficient and powerful way to analyze the effect of a group of independent variables on a binary outcome by quantifying each independent variable's unique contribution. A logistic regression model allows us to establish a relationship between a binary outcome variable and a group of predictor variables (http://www.ats.ucla.edu accessed on 01/08/2016). It models the logit-transformed probability as a linear relationship with the predictor variables.

In this study, let **y** be the binary outcome variable indicating market participation or non-participation. With 0/1 and p be the probability of y to be 1, p = prob(**y**=1). Let **x1**, .., **xk** be a set of predictor variables as shown in Table 1. The logistic regression of **y** on **x1**, ..., **xk** estimates parameter values for β_0, β_1, . . . , β_k via maximum likelihood method of the following equation:

$$\text{Logit}(p) = \log(p/(1-p)) = \beta_0 + \beta_1 * \mathbf{x1} + \ldots + \beta_k * \mathbf{xk} \quad (1)$$

In terms of probabilities, the equation in 1 is translated into

$$p = \exp(\beta_0 + \beta_1 * \mathbf{x1} + \ldots + \beta_k * \mathbf{xk}) / (1 + \exp(\beta_0 + \beta_1 * \mathbf{x1} + \ldots + \beta_k * \mathbf{xk})) \quad (2)$$

Multiple regression analysis of effect of transaction related factors on quantity of pigeon peas sold by producers

A multiple regression model used transaction cost related to variables (factors) as shown in Table 5 this also shows the denotation of the variables. The variables were grouped mainly into three categories as suggested by Makhura (2001); household endowment, access to information and household characteristics; and a fourth group, other factors was created. Dummy variables were used to represent categorical variables as suggested by Landau and Everitt (2004). The dependent variable used in the model was quantity of pigeon peas sold by household. The linear regression model takes the following form as shown in equation 3:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \varepsilon \quad (3)$$

where Y represents the quantities of pigeon peas sold, and $X_1 \ldots X_k$ represent the explanatory variables as shown in Table 2. The error term, ε, represents the collective unobservable influence of any omitted variables. In a linear regression, each of the terms being added involves unknown parameters, $\beta_0, \beta_1, \ldots \beta_k$, which are estimated by "fitting" the equation to the data using least squares (Rubinfield, 2011).

RESULTS AND DISCUSSION

Cross-tabulation

Cross-tabulation analyzed factors that were postulated to have an effect on pigeon peas market participation**.** Of these factors, as shown on Table 3, only eight were found to have had an effect on market participation at 5% level of significance**.** As shown in Table 3, three variables namely, district of residence, regular participation in group meetings and trust in group members were observed to be strongly associated with market participation at 1% level of significance. The study also found that adequate labour, access to loan and access to extension services were associated with market participation at 5% level of significance. Variables that were found to have had an effect on market participation were further analyzed to determine the magnitude and directionality of effect on participation in the market by pigeon peas producers.

Analysis of factors that affected market participation and direction and estimation of strength of effect

Based on logistic regression analysis; the study found a positive relationship between residence in Moatize District and market participation. Households resident in Moatize District were 3.29 times as likely to participate in the pigeon peas market as those residing in Tsangano and Angonia Districts. The main pigeon peas market is located in Moatize District. The results are consistent with findings on similar work on other crops by Goetz (1992), Montshwe (2006), Bahta and Bauer (2007) and Omiti et al. (2009), that observed that distance from the farm to point of sale influence market participation, the closer to market the high likelihood that a household participates.

The results of logistic regression analysis revealed that labour adequacy had a positive relationship with market participation (1.69). It was observed that a unit increase

Table 2. Explanation of variables used in the multiple regression model.

Category	Variable	Explanation
Household endowment	Casual labour	Dummy variable representing involvement of household in casual labour exchange as source of income, 1 = partake in casual labour otherwise = 0
	Livestock index	Livestock ownership index constructed as proportion of cattle, goats and chickens with equal weighting of 0.33 except cattle with 0.34
	Transport index	Ownership of transport index constructed as proportion of bikes, bicycles, scotch cart and wheelbarrow, each given an equal weighting of 0.25 or 25%
	Adequate food	Dummy variable for food security status of household in 2015, 1= adequate food, 0 = inadequate food
Access to information	Extension service on pigeon peas	Dummy variable for extension (advisory) service on pigeon peas production in 2015 season, 1 = received service, 0 = no service
	Time to Zobue	Time taken to travel from homestead to Zobue, the main pigeon peas market (minutes)
	Pigeon peas knowledge	Dummy variable for knowledge on pigeon peas production; 1 = had adequate knowledge, 0 = otherwise
Household characteristics	Age	Age of household head (years)
	Education	Education level of head of household (years)
	Active members ratio	Ratio of active household members
	Experience	Agricultural production experience of household head (years)
Other factors	Time of planting	Dummy variable for timely planting of pigeon peas; 1 = planting 1 to 2 weeks after first rains, 0 = planting later

in labour increased pigeon peas market participation by a factor of 5.42. The analysis also showed that households that had more labour were 5.42 times more likely to participate in the pigeon peas market than those that had less labour. As shown in Table 3, the relationship between labour adequacy and market participation is statistically significant ($p<0.05$), and with that probability the relationship due to chance is extremely low. Thus pigeon peas producers' market participation was influenced by labour availability, and this revelation confirms assertions by Mwongoso et al. (2015), Barret (2008) and Green (2006) that shows that labour availability influence market participation. Logistic regression analysis further revealed that access to credit had a positive relationship (1.19) with pigeon peas market participation; consistent with findings by Mwongoso et al. (2015). As portrayed on Table 3, an increase of one unit in access to credit increased market participation by a factor of 3.29. Producers that had access to credit or loan were 3.29 times more likely to participate in the pigeon peas market than those that did not. The probability that the observed relationship could be attributed to chance is extremely low and the study concluded that there was a relationship between access to credit and pigeon peas market participation.

A positive relationship between regular (at least once a month) attendance of group meetings and pigeon peas market participation was also revealed. Producers that attended group meetings at least a month were 26.25 times more likely to participate in the market than those that attended meetings irregularly. The relationship was statistically significant ($p<0.05$), and the study concluded that regular attendance of farmer group meetings positively influenced pigeon peas market participation. The results are congruent with findings on similar work by Korir et al. (2015), that indicated that attendance of meetings positively influence level of commercialization among French beans farmers.

Table 3. Cross-tabulation of market participation status by selected factors.

Variable	X^2	Fischer's exact test (2 -sided sig)
District (Moatize)	30.21***	0.00
Sex (male)	2.35	0.15
Phone ownership	2.42	0.14
Experience of household head	3.33	0.399
Household size	13.77	0.133
Ratio of active members	11.99**	0.028
Adequate labour	5.98**	0.03
Casual labour	3.38*	0.09
Adequate food	14.06*	0.06
Source of income	1.99	0.33
Livestock	1.41	0.27
Transport	1.55	0.27
Group membership	3.51*	0.1
Credit/Loan	5.14**	0.03
Frequent group meetings	15.63***	0.00
Village trust	2.92	0.16
Group trust	12.49***	0.00
Pigeon peas knowledge	1.05	0.50
Extension service	5.76**	0.03

NB. Significance level * = 10%, ** = 5% and *** = 1%.

Table 4. Logistic regression analysis of factors that affected market participation.

Variable	-2 Log likelihood	Overall classification (%)	Beta β	*SE* β	Wald X^2	*p*-value	Exp(B)
District	64.35	78.10	1.19	0.28	18.53	0	3.29
Adequate labour	74.13	78.10	1.69	0.74	5.17	0.02	5.42
Access to credit	74.00	76.70	1.19	0.28	18.53	0	3.29
Attended frequent group meetings	30.34	83.80	3.27	0.95	11.9	0	26.25
Trusted fellow group members	24.40	82.40	3.38	1.18	8.22	0	0.25
Access to extension service	73.40	76.70	-1.39	0.6	5.35	0.02	0.25

Trust among group members was found to have been positively related to market participation. A unit increase in trust of group members increased the odds of market participation by a factor of 0.25. A statistically significant ($p<0.05$) relationship between market participation and trust of fellow group members was observed, and it was concluded that social capital (trust) positively influenced pigeon peas market participation. Olwande and Mathenge (2012), Korir et al. (2015) and Mwongoso et al. (2015) also found that market participation was influenced by social capital.

The ability of the logistic regression model to predict market participation decision was measured using the -2 Log Likelihood statistics, and the smaller the value the better the model predicted effect of variable on market participation. In the validation, the -2 Log Likelihood statics were observed to be relatively low as shown in Table 4, and based on that statistic; frequency of group meetings were observed to have predicted the best likelihood of market participation, and access to extension service prediction model had the least accurate measure of market participation. The overall classification percentage also reflected how well the single model was able to classify households into the two groups of participation and based on the measure as indicated by the -2 Log likelihood statistics.

Multiple regression analysis of effect of transaction related factors on quantity of pigeon peas sold by producers

The multiple correlation coefficient R = 0.893 shown on model summary (Table 5); showed a strong correlation

Table 5. Multiple regression model summary output.

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.893[l]	0.798	0.713	74.15023

Table 6. Multiple regression coefficients output.

Variable	Standardized coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	-	2.571	0.015	201.969	1753.212	-	-
Age	0.514	2.445	0.020	0.927	10.267	0.147	6.794
Education	-0.148	-1.527	0.137	-16.400	2.359	0.693	1.443
Experience in farming	-0.668	-2.997	0.005	-14.310	-2.720	0.131	7.638
Casual labour	-0.397	-2.922	0.006	-190.42	-33.876	0.353	2.834
Adequate food	-0.231	-2.452	0.020	-280.81	-25.812	0.736	1.358
Livestock index	0.475	3.852	0.001	10.103	32.841	0.429	2.331
Pigeon peas knowledge	0.111	1.174	0.249	-54.296	201.537	0.731	1.367
Extension service on pigeon peas	0.371	3.174	0.003	36.388	167.246	0.477	2.096
Time to Zobue	-0.748	-4.016	0.000	-1.475	-0.481	0.188	5.326
Time of planting	0.366	2.696	0.011	59.245	427.098	0.354	2.827
Transport index	0.273	2.621	0.013	48.857	391.347	0.600	1.667
Ratio of active members	-0.345	-3.333	0.002	-1810.7	-435.864	0.606	1.649

between the quantities of pigeon peas sold and those predicted by the regression model, that accounted for 79.8% (shown as R square) of variability in the quantities of pigeon peas sold. The R square was adjusted to 71.3% to compensate for chance increases due to inclusion of larger sets of variables as recommended by Der and Everrit (2001). The error term of the model was 74.15 as shown in Table 5, which was small given that the quantities of sold pigeon peas ranged from 0 to 550 kg.

The ANOVA output provided an *F*-test for the null hypothesis that none of the explanatory variables were related to the quantity of pigeon peas sold. In this analysis, the null hypothesis was clearly rejected *(F (13, 31*) = 9.42, *p =0.00*, and concluded that at least one of the ten variables was related to quantities of pigeon peas sold. The multiple regression standardized coefficients are shown in Table 6. The standardized coefficients measured the change in dependent variable (quantities of pigeon peas sold) in units of its standard deviation when the explanatory variable increased by one standard deviation (Landau and Everrit, 2004). The standardization was used in this study since it allowed for comparison across the twelve explanatory variables that were significantly correlated to quantities of pigeon peas sold.

Of the twelve variables in the regression model, six positively influenced the quantities of pigeon peas sold. These were age of household head, livestock ownership, transport ownership, access to pigeon peas advisory service, knowledge on pigeon peas production and time of planting. All the variables had significant influence on quantities of pigeon peas sold except knowledge on pigeon peas production. The age of household head had the highest positive effect on increase in pigeon peas sold. An increase in the age of household head by one standard deviation was estimated to increase quantity of pigeon peas sold by 0.514 standard deviations. This finding is congruent with work on similar studies on one hand, for example Oparinde and Daramola (2014) and Jagwe et al. (2010) found that age of household head had a positive influence on intensity of market participation by producers. Yet, on the other hand contrary to findings by Onoja et al. (2012), Makhura (2001) and Macharia et al. (2014) contend that age limits market participation.

Ownership of transport had the least positive effect on quantity of pigeon peas sold. An increase in ownership of transport by one standard deviation was estimated to increase quantities of pigeon peas sold by 0.27 standard deviations. Six of the twelve variables in the regression model varied inversely with quantities of pigeon peas sold. These variables included; education and farming experience of household head, ratio of active household members and involvement in casual labour as source of income, food security, and time taken to travel to Zobue market; a variable. All the six variables varied significantly negatively with quantities of pigeon peas sold except level of education of household head. Time taken to

travel to Zobue had the largest negative effect on quantities of pigeon peas sold; an increase of one standard deviation on time taken to travel to Zobue reduced quantities sold by 0.748 standard deviations. Multiple regression analysis further revealed that food security (having adequate food) had the least significant negative influence on pigeon peas sold contrary to; that is an increase of one standard deviation of food security reduced quantities of pigeon peas sold by 0.21 standard deviations. Even though statistically insignificant, an increase of one standard deviation of education level of household head resulted in the least reduction of pigeon peas sold (0.15 standard deviations)

Variable inflation factors (VIF) statistics indicated that the data were within acceptable range of multicollinearity (VIF >10 or tolerance <0.1) and as such validated the multiple regression coefficients obtained in the analysis. It was found that ownership of transport and livestock were strongly associated with pigeon peas market participation. One standard deviation increase in livestock index increased volumes of pigeon peas sold by 0.475 standard deviations and an increase of one standard deviation on transport index increased volumes of pigeon peas sold by 0.273 standard deviations. Pigeon peas market participation was thus influenced by livestock and transport ownership, findings consistent with studies conducted by other researchers for example Barrett (2008), Boughton et al. (2007) and Green (2006) showed that smallholder private assets especially livestock and transport strongly influenced crop market participation. Providing casual labour to other farmers was found to be strongly inversely related to quantities of pigeon peas sold; households that participated in casual labour sold fewer volumes of pigeon peas, confirming earlier findings made through logistic regression model that labour adequacy, rather positively influenced pigeon peas market participation. Participating in casual labour reduce households capacitate to produce marketable volumes of pigeon peas. As suggested by Makhura et al. (2001) reorganization of household labour in order to produce enough for the market is part of transaction costs.

The results of the study showed that access to extension services significantly positively influenced quantities of pigeon peas sold. Thus, access to information (extension services) motivated households to sell larger proportion of their produce. The significant effect of access of extension services on market participation showed the contribution of reduced search, information, and negotiation costs in the marketing of pigeon peas and in increasing pigeon peas productivity.

Time taken to reach the main market, Zobue in Moatize District had a negative influence on the quantities of pigeon peas sold confirming earlier findings made through the logistic regression model. Thus, geographical location of household had a strong influence on quantities of pigeon peas sold, the further the household from the main market, the less the quantities sold. Thus location specific transaction costs had a significant effect on market participation, with households residing near main markets motivated to participate than those located further away. Time specificity, represented by time of planting significantly influenced volumes of pigeon peas sold. Producers that planted early sold larger quantities of pigeon peas than those that planted late. An increase of one standard deviation in time of planting increased volumes of pigeon peas sold by 0.366 standard deviations. Indeed, planting early promote pigeon peas market participation.

The study found that among the household characteristics, age of household head significantly influenced volumes of pigeon peas sold, older household heads made decisions to sell more produce as compared to younger household heads. However, it was found that farming experience of household head varied inversely with volumes of pigeon peas sold. The finding is consistent with revelations of logistic regression model; thus indeed experience of household negatively affected pigeon peas market participation.

Conclusions

Pigeon peas market participation was positively influenced by proximity to main market depicting location specificity of farm; access to credit, social networks depicted by regular attendance of farmer group meetings; and trust among group members; and age of head of household part of household organization; household endowment in the form of livestock and transport ownership and adequate labour; access to information portrayed by access to extension services and knowledge on pigeon peas production, and time specificity of operations represented by early planting. However, time to travel to main market, ratio of active household members, working in other farmers' fields on casual basis and food security limited smallholder producers market participation.

The study recommended the implementation of credit access schemes, investment in extension services; to improve access to information on production and marketing through dissemination of well-structured extension messages, setting up of well-equipped village based markets, setting up platforms for regular interaction of producers to build social capital and interventions that enable building of private assets such as livestock transfer schemes. Furthermore, given the increasing importance of pigeon peas due to climate change, stable yields and increasing demand in India merits further research in other locations with larger samples particularly along the recently completed Zambia-Nacala Corridor railway line is recommended.

Conflict of interests

The authors have not declared any conflict of interests.

REFERENCES

Atlanta Clinical & Translational Science Institute (2008). Ethical dilemmas in scientific research and professional Integrity. http://www.actsi.org/discovery/ethics-center.html

Barrett BC (2008). Smallholder market participation: Concepts and evidence from Eastern and Southern Africa. Food Policy 33:299-317.

Boughton D, Mather D, Barrett BC, Benfica R, Abdula D, Cunguara B (2007). Market Participation by Rural Households in a Low-Income Country: An Asset-Based Approach Applied to Mozambique. Faith and Economics 50:64-101.

Korir HC, Lagat JK, Mutai MC, Ali OM (2015). Influence of social capaital on producer groups, performance and market access amongst smallholder french beans farmers in Kiriyaga County, Kenya. J. Eco. Sustain. Dev. 6:2.

Landau S, Everitt SB (2004). A Handbook of Statistical Analysis using SPSS. Chapman & Hall/ARC.

Makoka D (2009). Small farmers' access to high-value markets: what can we learn from the Malawi pigeopea value chain? University of Malawi, Centre for Agricultural Research and Development , Malawi

Makhura M, Kirsten J, Delgado C (2001). Transaction costs and smallholder participation in the maize market in Northern Province of South Africa". Seventh Eastern and Southern Africa Regional Maize Conference, 11th -15th February, 2001, pp. 463-467 (Place missing on paper).

Onoja OA, Usoroh BB, Adieme DT, Deedam NJ (2012). Determinants of market participation in Nigerian small-scale fishery sector: Evidence from Niger Delta Region. Consilience: J. Sustain. Dev. 9(1):69-84

Oparinde LO, Daramola A (2014). Determinants of Market Participation by Maize Farmers in Ondo State, Nigeria. J. Econ. Sustain. Dev. 5:1.

Peng CYJ, Lee KL, Ingersol (2012). An Introduction to Logistical Regression Analysis and Reporting. Indiana University-Bloomington

Rubinfield LD (2011). Reference Manual on Scientific Evidence. 3rd Edition. The National Academic Press.

Reardon T, Timmer CP (2006). Transformation of Markets for Agricultural Output in Developing Countries Since How Has Thinking Changed?" chapter 13 in RE Evenson, Pingali P, Schultz TP (editors). 2006. Volume 3 Handbook of Agricultural Economics: Agricultural Development: Farmers, Farm Production and Farm Markets Amsterdam: Elsevier Press.

Stoltzfus CJ (2011). Logistic Regression: A Brief Primer. Research Methods and Statistics. Society for the Academic Emergency Medicine Journal Number 18.

Staatz J (1994). The Strategic Role of Food and Agricultural Systems in Fighting Hunger Through Fostering Sustainable Economic Growth. MSU Department of Agricultural Economics Staff Paper No. 94 - 39. East Lansing: MSU

Timmer CP (1988). The Agricultural Transformation. In H. Cheneryand T.N. Srinivasan (Eds.) Handbook of Development Economics. Amsterdam: North-Holland 1:275-331.

Warner JM, Campbell DA (2000). Supply Response in and Agrarian Economy with Non-Symmetric Gender Relations", World Dev. 28(7):1327-1340.

Walker T, Slim B, Cunguara B, Donovan C, Rao PP, Amane M, Siambi M (2015). Pigeonpae in Mozambique: An emerging success story of crop intensification in smallholder agriculture report. Modernizing extension and advisory services project. University of Illinois at Urbana-Champaign. Illinos, USA http://www.ats.ucla.edu/stat/mult_pkg/faq/general/odds_ratio.htm. accessed 01/08/16