

Original Research Article

Market Information and Extent of Agricultural Commercialization: Empirical Evidence from Smallholder Farmers in Effutu Municipality of Ghana.

ABSTRACT

Aims: Agricultural commercialization literature has shown that access to market information influence market participation by smallholder farmers. However, documentation on which type of market information access influences the extent of market participation in the study area is missing. This paper therefore analyzed the effect of the different market information access on the extent of agricultural commercialization using data on smallholder maize farmers in the Effutu Municipality of Ghana.

Study design: The study basically used primary data collected through farmer interviews. A structured questionnaire was used to collect information on demographic characteristics, institutional factors, production, marketing and post-harvest activities.

Place and Duration of Study: The study was conducted in 15 communities in the Effutu Municipality of Ghana between April and May, 2011.

Methodology: The selection of 150 farmers followed a multi-stage systematic random sampling technique. The truncated regression model was used for the analysis.

Results: The truncated regression estimate revealed that gender, total number of adults that assist with farming activities, education, market information, farm size, access to land and non-farm income significantly explain variation in the extent of agricultural commercialization.

Conclusion: The study concluded that the type of market information outlet is critical for market decision-making. Access to market information from informal sources such as farmer association, friends and relatives significantly impacts on the extent of household agricultural commercialization. It is recommended that agricultural development projects strengthen the informal market information delivery system by strengthening farmer based organization complemented with incentive packages to sustain farmers' interest.

Keywords: Market information, Agricultural commercialization, Smallholder, Ghana, Truncated

1. INTRODUCTION

The agricultural production system in Ghana is dominated mostly by smallholder farmers who are faced with myriads of challenges ranging from technology adoption to post-harvest activities. Production is largely rain-fed with relatively lower output as a result of low investment in infrastructure like irrigation and market intelligence centers. However, they play a major role in food production and market participation. Smallholder agriculture is likely to remain the major engine for rural growth and livelihood improvement for some time in most of sub-Saharan Africa [9]. According to [2], development of the smallholder systems in Africa can lead to development of the agricultural sector in many African countries. They further stated that non-competitive value chains and limited information about remunerative

markets, and risk aversion of smallholders limit their integration into markets. Agricultural support to smallholder farmers in the form of business capacity development, technology dissemination, training through farm demonstrations, provision of input credit, market information and infrastructure may lead to a sustainable growth in the agricultural system of Ghana.

Agricultural production entails investment of resources, and farmers will have no incentive for making investments in areas where there is little opportunity for marketing their products, or if the returns accruing from the sales of agricultural products do not reflect the opportunity cost of investment. As a result, most farmers in areas with few marketing opportunities are engaged primarily in subsistence agriculture, which has constrained improvement in their quality of life [26]. According to [9, 14, 18, 19, 21], the problem of market access is linked to farmers' inability to meet market standards, low volumes of produce, wide dispersion of producers, presence of middlemen and perceived low prices in the formal market. In addressing the major agricultural production and marketing challenges in Ghana, development policies have focused on the modernization and commercialization of the agricultural sector [38, 39]. Notably among the policies is the Food and Agriculture Sector Development Policy II (FASDEP II) of Ghana which seeks to increase competitiveness and enhance integration of farmers into domestic and international markets. The aim is to enhance Ghana's comparative advantage and translate it into competitive advantage in producing the needed volumes and quality of commodities on a timely basis. Efforts at improving access to market information and intelligence, relevant market infrastructure and agricultural financing are some of the strategies adopted by the policy to enhance the competitiveness and integration of farmers into markets.

Lack of access to market information is a major constraint to the intensity of agricultural commercialization. According to [35], smallholder farmers in most developing economies find it difficult to participate in markets because of numerous constraints and barriers. These are mostly reflected in the hidden costs that make it difficult to access input and output markets. Transaction costs are the embodiment of access barriers to market participation for most resource-poor smallholders [7,17]. A fundamental transaction cost these farmers face is the cost of obtaining information [41]. Imperfections in information markets make costs of obtaining reliable information prohibitively high, creating welfare losses for participants and barriers to entry for others [8]. Information asymmetry is more likely to cause market failure [40]. Individuals in the value chain may hold on to market information at the detriment of the other players thus affecting the extent of commercialization.

Baseline studies conducted in Ghana shows that use of radio, agricultural extension agents, friends and mobile phones were the major source of market information to smallholder farmers [25]. Radio, television and wireless technology as well as the internet are important tools for meeting the information needs of small scale farmers which ranges from extension education, agricultural technology, agricultural credit and marketing [31]. However, the use of mobile phone is increasingly becoming a major source of market information. [26] established that the use of mobile phone significantly influence the choice of marketing channel by smallholder yam farmers in Brong Ahafo region of Ghana. Establishment of Agribusiness Centres (ABCs) also serve to supply the marketing needs of farmers. Glut situation mostly occur as a result of oversupply of farm produce to the market due to lack of market information. The process leads to a downward pressure on the market price and subsequently fall in income. Access to market information can enhance farmers' access to markets through better negotiation and meeting the demands of the market [5,28], on condition that constraints to access to inputs are addressed. Improved telecommunications can lower the cost of acquiring information, lower risks, and improve market efficiency. These services can offer previously unconnected farmers access to up-to-date price

information and broaden market participation [12]. Time and money can be saved by substituting travel to markets with telecommunications, and these savings can be especially important for small scale sellers. According to [40], facilitation of greater access to farmers' knowledge about markets and prices can contribute effectively to breaking the cycle of poverty.

Several approaches have been used to analyze factors influencing agricultural commercialization of smallholder farmers in Africa. The econometric specification usually depends largely on the objective of the study and the type of data available [42]. Some studies have modeled agricultural commercialization as a two-step analytical approach involving the unobservable decision to commercialize and the observed degree of commercialization [47,1]. In determining the factors that influence the degree of maize commercialization among households in Ondo State, Nigeria, [34] used the truncated regression model. They observed that age, experience of the household head, farm practice and quantity of harvested maize had significant influence the proportion of maize sold in the rural area of the State.

[13] used the double hurdle (DH) model to analyze the factors that influence the intensity of member participation in certain group activities. The DH model combined a binary model to predict zero values and a zero-truncated continuous distribution to predict non-zero values. For the second hurdle, they used two different specifications, one with the quantity and the other with the share of collectively sold bananas as dependent variables. They concluded that access to irrigation facilities, yield, number of groups, education, household size, farmers' perceived degree of exploitation, group size and delayed payment by traders significantly influenced the share of collectively sold bananas in Kenya.

[33] used the truncated regression model to analyze the factors that determined the percentage sale of milk, vegetable and maize by smallholder farmers in Kenya. Based on the analysis, they concluded that total output of milk produced, distance to market and market information from informal source significantly explained the percentage of milk sold. In the case of vegetable, they observed that male-headed households, total output of vegetable produced, distance to market, market information from formal source and unit price significantly determined the extent of participation in vegetable market whereas education, non-farm income, total output of maize and distance significantly explained the variation in the intensity of maize commercialization.

Application of the logistic regression model within the transaction costs framework to analyze the factors enhancing market participation by small-scale cotton farmers in South Africa by [37] showed that age, ability to speak/understand English, region, ownership of transport, access to market information, distance to market, dependency ratio, trust, land size and ownership of livestock influenced the degree of commercialization.

Agricultural commercialization literature has shown that access to market information influence market participation by smallholder farmers. However, documentation on which type of market information access influences the degree of market participation in the study area is missing. In this paper, the different access to market information sources such as access to mobile phones, membership of farmer association and access to extension agents are employed to empirically determine their effect on intensity of agricultural commercialization. The present study therefore test the hypothesis of whether the type of information source has a significant effect on maize commercialization. This paper therefore analyzed the effect of access to market information on the extent of agricultural commercialization using data on smallholder maize farmers in the Effutu Municipality of

Ghana. The findings of the study will make empirical contributions to the body of literature and policy formulation to ensure sustainable growth in the crop sub-sector of Ghana.

2. METHODOLOGY

2.1 Study Area

The Effutu Municipal is situated between latitudes 5020 north and latitudes 0025 west and 0037 west on the eastern part of the central region of Ghana. It is bordered to the north by Agona municipal, the north-east by the west Akim Municipal, to the south by the Gulf of Guinea, to the east by Gomoa district and Ga west Municipal, and on the west by the Gomoa district. The municipal covers an area of 417 square kilometres. The Effutu Municipality has a population of 68,597 which represents 11% of the population of the central region according to the 2010 population and housing census. The topography of the area is characterized by isolated undulated highlands located around the Effutu sub-district. The lowlands are found along the coastline-Senya and Winneba areas with isolated hills. The municipal experiences a five month dry season starting from November to March, followed by a seven month rainy season from April to October. Rainfall figures of the municipal are quite low (40cm-50cm) along the coastal but are higher in the hinterlands with the mean annual rainfall ranging between 50cm and 70cm. The loamy soil which is mostly found in the semi-deciduous forest zones of the district supports the production of cassava, plantain, yam, maize, cocoa, cola nuts, pineapple, citrus and pawpaw. Agriculture constitutes the main economic activity of the district economy and employs about 58% of the district population. Seventy percent of the district population produces at the subsistence level. Crops, livestock and fisheries are the main sectors of agricultural production in the district. Crop production employs about 50% of the total population.

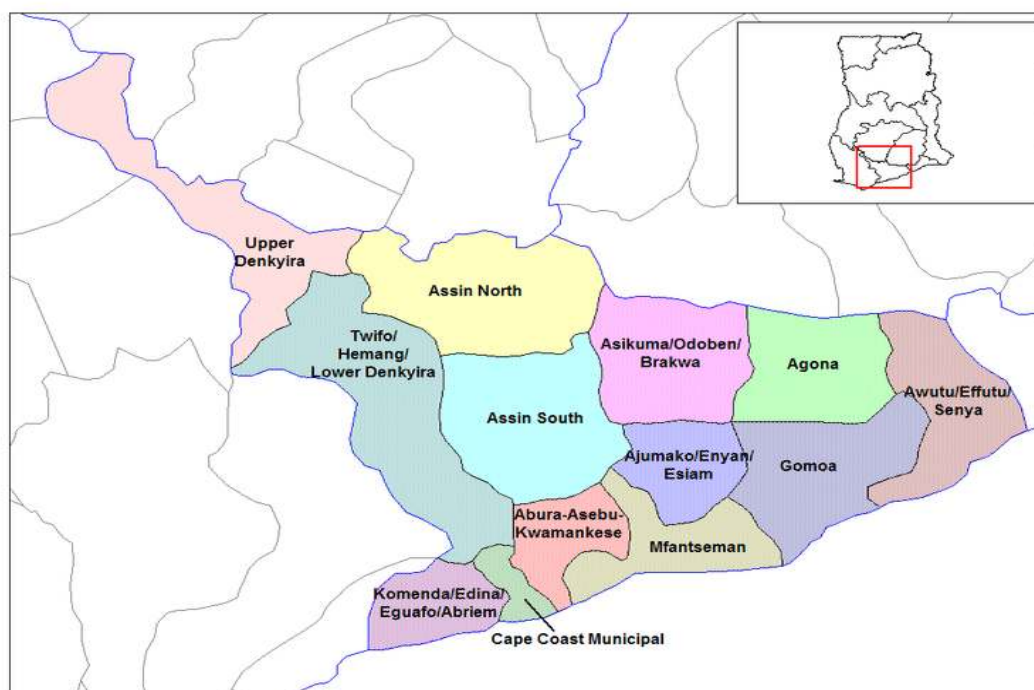


Figure 1: Administrative Map of Effutu Municipality

2.2 Data and Sampling Technique

Data for study was obtained from primary source with the aid of a structured questionnaire. Data on household level included household characteristics, institutional factors, production and sales volume, household income and off-farm income. Maize was the main household food crop by majority of the farmers. A total of 150 smallholder maize producers were systematically selected and interviewed. The selection of the maize producers followed a multi-stage systematic random sampling technique. In the first stage, 15 communities were purposively selected based on the level of maize production. The second stage involves random selection of 150 farmers from the 15 purposively selected communities in the Effutu Municipality of Ghana.

2.3 Method of Analysis

An individual participate in a market if the utility derived in participation exceeds the utility of non-participation. It is assumed that the decision to participate and the intensity of participation are independently determined. [6] showed that marketing decisions are often made sequentially rather than simultaneously. Based on data and nature of the analysis, the truncated regression model was chosen over the Tobit model. The truncated regression model was employed to determine whether access to market information influences the intensity of maize market participation. Observations on positive and greater than the lower intensity of maize commercialization are used in the analysis. The intensity of maize commercialization (Y_i) is specified as:

$$Y_i = \frac{\text{Value of Maize Sold (GHS)}}{\text{Value of Maize Produced (GHS)}} \quad (1)$$

Smallholder farmers who do not commercialized were excluded as the lower boundary of truncation. According to [15], the model assumes normal distribution with constant variance specified as follows:

$$Y_i^* = \beta_i X_i + \mu_i, \mu_i \sim N(0, \sigma^2) \quad (2)$$

Where Y_i is the degree of maize commercialization which depends on the latent variable Y_i^* being greater than zero and conditional to the decision to adopt fertilizer, X_i is the vector of explanatory variables hypothesized to influence degree of maize commercialization. The empirical model employed to determine the fertilizer use intensity is given as:

$$Y_i = \beta_0 + \beta_1 \text{Agehh} + \beta_2 \text{Gend} + \beta_3 \text{Eduhh} + \beta_4 \text{Eduhh2} + \beta_5 \text{Adl} + \beta_6 \text{Extacs} + \beta_7 \text{Assoc} + \beta_8 \text{Lansta} + \beta_9 \text{fmsize} + \beta_{10} \text{Crdav} + \beta_{11} \text{Lanaces} + \beta_{12} \text{Dismkt} + \beta_{13} \text{ofmi} + \beta_{14} \text{Acsmob} + \mu_i \quad (3)$$

Where, β_0 is the constant term $\beta_1, \beta_2, \beta_3, \dots, \beta_{14}$ are the parameters of the respective explanatory variables in the model, and μ_i is the error term. The estimates for these parameters were obtained using the STATA SE software version 11. Table 1 summarizes the host of explanatory variables that are potentially expected to explain variation in degree of maize commercialization and their *a priori* expectations.

Table 1: List of Explanatory Variables

Variable	Description	A priori Expectation
Age	Age of household head in years	+/-
Gender of household head (Gend)	1 if male and 0 other wise	
Education (Eduhh)	Number of years	+
Education squared (Eduhh2)	Number of years squared	-
Total adults in household (Adl)	Total number of adults that assist on the farm	+/-
Membership of farmer association (Assoc)	1 if member of farmer association and 0 otherwise	+
Access to Extension agent (Extacs)	1 if farmer has access to extension and 0 otherwise	+
Access to credit (Crdav)	1 if household receive credit and 0 otherwise	+
Farm size (Fmsize)	Farm size of household measured in acres	+
Land ownership status (Lansta)	1 if household owns land and 0 otherwise	+
Access to farm land (Lanaces)	1 if household has access and 0 otherwise	+
Distant to market (Dismkt)	Distance in Km from farmstead to market	-
Off-farm income (ofmi)	Income from off-farm measured in Ghana cedi (GH¢)	+
Access to informal market information (Accmob)	1 if farmer has access to information from friends and relatives and 0 otherwise	+

207
208 Age of household head is expected to influence maize commercialization both positively and
209 negatively. It is expected that younger farmers are more dynamic, open to new ideas and
210 may have better understanding of commercialization issue as most older farmers view
211 farming as a way of life rather than a business [37]. Alternatively, age could serve as a proxy
212 measurement of experience and availability of resources. It is possible that older and more
213 experienced heads are able to take better production decisions and have greater contacts
214 which allow trading opportunities to be discovered at lower cost than younger ones [10].
215
216 Gender of household head is expected to capture the differences in market orientation
217 between males and females. Male-headed households are expected to have a higher
218 propensity to participate in markets than their female counterparts.
219
220 Education is expected to exert a positive effect on commercialization. [10,45,43,30] argued
221 that education will endow the household with better production and managerial skills.
222 According to [16] education is an important tool to escape poverty once the content of the
223 education addresses the needs of the target people. It enhances farmers' access and
224 interpretation of information and also enable individual farmers to make informed decision on
225 commercialization. It is also possible that education could increase the chances of the
226 household head earning non-farm income. This could reduce the household dependency on
227 agriculture especially where there are competing and more remunerative employment
228 opportunities available in the area that require skills that are enhanced by more education
229 [23]. The study further tested the possibility of the hypothesis that at a certain level of

230 education, farmers will move out of agriculture into more remunerative employment
231 opportunities by including a square term of education as covariates in the model.
232

233 The total number of adults in the household that assist on the farm is expected to influence
234 commercialization both positively and negatively. For this study, the focus on the household
235 size was the male adults that assist on the farm. According to [24], the size of the household
236 represents the productive and consumption unit of the household. Adults in the households
237 that assist on the farm are expected to serve as a source of supply of family labour for
238 production activities and in such a situation impact positively on commercialization. It is also
239 argued that there is continuous development with intensive agricultural systems, as
240 household size increases the productivity of the land rises and exceeds subsistence
241 requirements and this will lead to an increase in marketed surplus. However, the total
242 number of adults may increase the household size thus demand greater food needs which
243 reduces market participation. [23] also hypothesized that the propensity to participate into
244 the market economy declines with numbers of household members.
245

246 Market information sources were measured by three main variables - access to extension
247 services, membership of farmer association and information access through friends and
248 relatives who are non members of farmer associations. The effect of type of market
249 information sources are tested empirically to established a conclusive directional effect.
250 Access to informal source of market information as measured by membership of farmer
251 association/group is expected to exert a positive effect on commercialization. Access to
252 market information is necessary for making both production and marketing decisions [32].
253 Belonging to a farmer association enhances opportunities for information sharing thus
254 reducing the transaction cost of search for market information. The farmer organization also
255 serves as a collective action for strengthening farmers' bargaining and lobbying power and
256 facilitates obtaining institutional solutions to some problems and coordination [27].
257 Information is expected to empower the individual farmers to make informed decision
258 regarding resource allocation, market-driven commodity, effective demand, pricing and
259 distribution pathway.
260

261 Access to extension agents is used as a proxy measurement of formal source of production
262 and market information. Extension agents are the conduit for transfer of technology
263 developed by research which is expected to impact positively on farmers output *ceteris*
264 *paribus*. In some cases, extension agents may provide useful information to farmers through
265 farmer fora such as Farmer Field School (FFS), Farmer Learning Centres (FLC) due to
266 logistical constraint associated with personal contact. It is however argued that the quality of
267 extension programmes rather than the access is essential in the realization of the farmers
268 need. Extension services can be an effective tool in delivering the information needed for
269 farmers to make informed decisions about new marketing strategies [29,22]. A positive
270 relationship is expected between extension access and extent of agricultural
271 commercialization.
272

273 Farmers who have access to credit are more likely to intensify sale of maize. According to
274 [4], research has shown that measures to alleviate smallholders' constraints such as access
275 to credit and technology generate a larger supply response than price and trade incentives
276 such as changes in the level of import tariffs [4]. Availability of credit and the associated cost
277 of credit according to [44] are crucial in the success of the agricultural industry. Credit could
278 be used to purchase factor inputs (planting material, fertilizer and crop protection), pay
279 wages, invest in machinery, or to smooth consumption. The availability of credit is expected
280 to lead to increased agricultural productivity and greater commercialization.

281 Access to land is a key determinant of commercialization. Access to production input like
282 land complemented by the right technology can increase the output of farmers and

commercialization. Farm size is expected to influence the extent of commercialization positively. According to [32], farm size may have indirect positive impacts on market participation by enabling farmers to generate production surpluses as well as overcoming credit constraints. Farmers with larger farm size are likely to enjoy economies of scale and suffer less from high transaction cost.

Land ownership is used as a proxy measurement of wealth. Farmers with productive assets are less vulnerable to shocks. [16] argue that acquisition and ownership of productive assets can pave the way for a family to participate in economic activities. Assets empower the rural poor by increasing their incomes, reserves against shock and choices to escape from harsh and exploitative conditions. Renting of land can provide farmers with the liquidity to access technology to produce marketable surplus.

Distance to market captures the transaction cost incurred by the farmers in terms of transportation of their produce to the market. [20] and [24] found that distance to the market negatively influences both the decision to participate in markets and the proportion of output sold. A higher transaction cost constraint farmers participation and intensity of commercialization. Greater distance poses higher transaction cost to farmers which affects the type of crop cultivated and technology adoption.

Off-farm income influences commercialization positively especially where the gain are reinvested in agricultural technologies. Access to non-farm income may lead to risk reduction in household decision making and thus increased propensity to undertake higher risk activities, notably selling crops or producing for the market. [1] also noted that non-farm income contributes to more marketed output if the non-farm income is invested in farm technology and other farm improvements. In other words farmers report a decline in output if off-farm income leads to off-farm diversification.

Finally access to market informal from informal source such as relatives, friends and neighbours are expected to impact positively on the degree of commercialization. The transaction cost associated with market information access from informal source is relatively lower than the formal sources of market information access. Farmers with lower transaction cost are more likely to participate in market.

3. RESULTS AND DISCUSSION

3.1 Factors Influencing Agricultural Commercialization

The analysis of determinants of market information access on the extent of agricultural commercialization was conducted on 150 households selected from different communities within the Municipality. Table 2 presents result of the truncated model estimation for the identification of the effect of market information access on the extent of agricultural commercialization. The significant Wald chi-square value of 107.22 indicates that the explanatory variables jointly influence the extent of agricultural commercialization. Gender, total number of adults in the household, education, farmer association, farm size, access to land and off-farm income were the significant factors influencing the extent of maize commercialization in Effutu Municipality of Ghana. Statistically and numerically, farm size was the most determining factor of degree of market participation (Table 2).

Gender exerted a positive effect on commercialization. The result indicated that intensity of agricultural commercialization by males was 9% lower than females. Males were expected to participate intensively in market due to access to productive input like land and input credit which is estimated to stimulate production volume. However, the result deviated from the *a priori* expectation because female farmers in the study area have contractual obligation with male farmers by selling directly to them after harvest. [11] showed that females tend to be

336 more aware of marketing channels because they are more networked socially and undertake
337 most agricultural activities.

338
339 Total number of adults was associated with an inverse relationship with degree of
340 agricultural commercialization. A unit increase in the number of adults in the household is
341 likely to decrease the degree of agricultural commercialization by 2%. This implies that
342 household members depend more on the farm produce for food. The result confirms the
343 findings of [37]. They established a negative effect of household dependency ratio on
344 commercialization. Contrary to the result, [26] found that an additional adult member of a
345 household increases the extent of cassava sales by 0.8%. Household depends more on
346 maize for food relative to cassava. The labour-intensive nature of cassava production
347 accounts for the importance of family labour. The present finding by the study implies the
348 importance of enhancing human productivity through agricultural training and participation in
349 farm demonstration.

350
351 Number of years of education and the conventional education squared both influenced the
352 extent of agricultural commercialization positively. A unit increase in the number of years of
353 formal education increased the extent of maize commercialization by 3%. [26] and [33] both
354 established a positive effect of education on the extent of maize commercialization in Ghana
355 and Kenya respectively. Human capital development is crucial for adoption and application
356 of agricultural technologies like use of improved seed and improved crop management
357 practices to increase surplus production for market. The result is rather not surprising
358 because the farmers in the study area are more exposed to education especially at the lower
359 level due to the influx of education facilities put up by the colonial masters. In order to further
360 test the hypothesis that increased in education beyond a certain minimum is likely to
361 decrease the extent of commercialization, education squared term covariate was included in
362 the model. The result confirms the hypothesis as a result of the negative effect education
363 squared posed on commercialization variable. A unit increase in education beyond certain
364 minimum level decreased agricultural commercialization by 0.3%. The result suggested
365 competition in terms of demand for farmers skill either in agriculture or off-farm employment
366 opportunity which is more remunerative. The result is supported empirically by the fact that
367 most of the study areas are accessible to major urban centres where employment
368 opportunities are prevalent [26].

369
370 Market information has been proven by the study to impact positively on agricultural
371 commercialization. Market information sources were captured by membership of farmer
372 association, access to extension services and information access from friends and relatives.
373 The directional effect of market information variable on commercialization varied with the
374 type of information source. It was observed that access to market information through
375 extension services and informal sources (friends and relatives) impacts negatively on the
376 extent of maize commercialization though not significant. The insignificant negative effect of
377 access to market information through extension access could possibly be as a result of
378 reduction in the number of contact and inadequate content of extension information.
379 Extension agents are poorly resourced and motivated which impact negatively on effective
380 delivery. Nonetheless, access to market information through farmer based organization
381 exerted a positive effect on the extent of maize commercialization. The finding indicates that
382 intensity of maize commercialization by farmers who access market information through
383 farmer association (informal source) was 6% higher than non-members of farmer
384 association. The finding of this study confirms that of [37] who observed a 2% increase in
385 market participation among farmers with access to informal market information source.
386 Contrary to the present finding, [33] observed that access to formal source of market
387 information influences the extent of maize supply in the peri-urban areas of Kenya. However,
388 they observed that increased access to informal market information source impacts

positively on the extent of vegetable supply in Kenya. Most farmer groups provide technical, marketing and financial services for farmers at a reduced transaction cost associated with information search and transportation. It can therefore be concluded that access to market information through informal sources may be a necessary condition for intensifying maize commercialization but not a sufficient condition. The informal market information type plays a major determinant role as a result of different level of access, participation and usage among target farmers. The implication of the result is that governmental and non-governmental development projects must strengthen the informal sources of market information.

Farm size significantly influenced the extent of maize commercialization positively. A unit increase in farm size increased the extent of maize commercialization by 19%. The result confirms the findings of [26] who established a 10% increase in maize commercialization for an additional unit of increase in farm size. An increase in farm size normally leads to an increase surplus for both household consumption and market. Farm size However, [37] and [3] established a significant negative effect of farm size on market participation. The reason underlying their finding was that, gains in land productivity and/or market sales were not large enough to offset the costs associated with the increase in production thus recommended that efforts to expand farm size should be accompanied by similar efforts to raise land productivity.

The present study established a positive effect between access to productive land and degree of agricultural commercialization. The extent of agricultural commercialization is higher for farmers with access to productive land relative to those without access by 3%. Traditional laws and customs limit access to productive land in farming communities with natives having more access to land than their non-natives counterparts. The finding implies that agricultural development projects should target native farmers to guarantee unlimited access to land for demonstrations of farm technologies for increased adoption and production volume.

Finally income from off-farm employment opportunities influenced the extent of agricultural commercialization negatively. The extent of maize commercialization decreases by 2% for every additional Ghana cedi of off-farm income earned. The result confirms the findings of [33] who established that non-farm income significantly reduce the amount of vegetables sold. [1] and [26] also obtained a similar result in their independent studies on agricultural commercialization in Kenya and Ghana respectively. It is likely that off-farm income triggers investment in non-farm activities. Empirically, cost of education and meeting household food demand attracts a larger share of household off-farm income in the study area.

427
428
429
430
431
432
433
434
435
436
437
438
439
440

Table 2: Truncated Regression Estimates of Degree of Agricultural Commercialization

Variable	Marginal Effect	Robust Std.	P> Z
----------	-----------------	-------------	------

	(dy/dx)	Error	
Gender	-0.0916	0.0420	0.029**
Total number of adults that assist on the farm	-0.0201	0.0120	0.094*
Age	0.0022	0.0018	0.231
Number of years of education	0.0272	0.0165	0.099*
Number of years of education squared	-0.0027	0.0016	0.095*
Access to extension services	-0.0053	0.0483	0.913
Membership of farmer organization	0.0600	0.0340	0.078*
Land ownership status	-0.0841	0.0565	0.136
Farm size	0.1875	0.0538	0.000***
Access to credit	0.0396	0.0362	0.273
Access to productive land	0.0262	0.0064	0.000***
Distance to nearest market	-0.0041	0.0026	0.113
Off-farm income	-0.0200	0.0109	0.066*
Informal market information access	-0.0014	0.0543	0.979
Wald chi2 (14)		107.22	
Prob>chi2		0.0000	
Log pseudolikelihood		41.2297	

Dependent Variable = Degree of agricultural commercialization
and *p < 0.10

***p < 0.01, **p < 0.05

4. CONCLUSION

This paper examined whether the type of market information outlets have any significant effect on the extent of maize commercialization in Effutu Municipality of Ghana. The study revealed that gender, total number of adults that assist with farming activities, education, market information, farm size, access to land and non-farm income significantly explain variation in the extent of agricultural commercialization. It was confirmed by the study that the type of market information outlet is critical for market decision-making. Access to market information from informal sources such as farmer associations significantly impacts positively on the extent of household agricultural commercialization.

The policy implication of the finding is that there should be a continuous effort by both governmental and non-governmental institutions to channel agricultural development projects that enhances technology adoption and increase market participation through farmer organizations to ensure effective participation and sustained interest.

REFERENCES

1. Alene AD, Manyong VM, Omany G, Mignouna HD, Bokanga M, Odhiambo G. Smallholder market participation under transaction costs: Maize supply and fertilizer demand in Kenya. Food Policy. 2008: 33: 318-328.
2. Al-Hassan RM, Egyir IS. and Abakah J. Farm household level impacts of information communication technology (ICT)-based agricultural market information in Ghana. Journal of Development and Agricultural Economics. 2013: Vol. 5(4), pp. 161-167, April, 2013

- 470
- 471 3. Amrouk EM, Poole N, Mudungwe N. & Muzvondiwa E. The Impact of Commodity
- 472 Development Projects on Smallholder's Market Access in Developing Countries. Case
- 473 Studies of FAO/CFC Projects. FAO Commodity and Trade Policy Research Working
- 474 Paper No. 35: 2013
- 475
- 476 4. Barrett C.B. Smallholder market participation: Concepts and evidence from Eastern
- 477 and Southern Africa. In Sarris and Morrison (eds) Food Security in Africa. Market and
- 478 Trade Policy for Staple Foods in Eastern and Southern Africa. FAO and Edward Elgar.
- 479 2010
- 480
- 481 5. Barrett C. Smallholder market participation: Concepts and evidence from eastern and
- 482 southern Africa. Food Policy. 2008: 34:299-317
- 483
- 484 6. Bellemare M, Barrett C. An ordered Tobit model of market participation: Evidence from
- 485 Kenya and Ethiopia. American Journal of Agricultural Economics. 2006: 88(2), 324–
- 486 337
- 487
- 488 7. Delgado C. Sources of growth in smallholder agriculture in sub-Saharan Africa: The
- 489 role of vertical integration of smallholders with processors and marketers of high
- 490 value-added items. Agrekon. 1999: 38(S1), 165–89.
- 491
- 492 8. Department for International Development (DFID). “Making Market Systems Work
- 493 Better for the Poor (M4P)”. Paper presented at ADB-DFID ‘learning event’ ADB
- 494 Headquarters. Manila, Filipinas, February. 2005.
- 495 http://www.markets4poor.org/m4p/dmdocuments/discussion_paper_No_9_final.pdf
- 496
- 497 9. Dorward A, Kydd J, Poulton C. Smallholder Cash Crop Production Under Market
- 498 Liberalisation: A New Institutional Economics Perspective. CAB International,
- 499 Wallingford, UK. p. 280. 1998. Accessed 10 March 2014
- 500
- 501 10. Enete AA, Igbokwe EM. Cassava Market Participation Decision of Household in Africa.
- 502 *Tropicultura*, 2009: 27(3): 129-136.
- 503
- 504 11. Etwire PM, Dogbe W and Nutsugah SK. “Institutional Credit Available to Smallholder
- 505 Farmers in the Northern Region of Ghana”. International Journal of AgriScience. 2013
- 506
- 507 12. Ferrand D, Gibson A, Scott H. Making Markets Work for the Poor: An Objective and an
- 508 Approach for Governments and Development Agencies. United Kingdom: Department
- 509 for International Development. 2004
- 510
- 511 13. Fischer E, Qaim M. Smallholder Farmers and Collective Action: What Determines the
- 512 Intensity of Participation?, Proceedings of the German Development Economics
- 513 Conference, 2011: Berlin 2011, No. 28
- 514
- 515 14. Freeman HA, Silim SS. Commercialization of Smallholder Irrigation: The Case of
- 516 Horticultural crops in Semi-arid Areas of Eastern Kenya. in H. Sally and C.L.
- 517 Abernethy (eds.) Private Irrigation in Sub-Saharan Africa: Proceedings of Regional
- 518 Seminar on Private Sector Participation an Irrigation Expansion in sub-Saharan Africa,
- 519 22-26 October, 2001. Accra, Ghana. IWMI, FAO and CTA
- 520
- 521 15. Greene WH. Econometric Analysis, Fifth edition (Prentice Hall, Upper Saddle River,
- 522 NJ). 2003

- 523
- 524 16. Heierli U & Gass T. Enhancing employment and income generation in rural areas.
525 Paper submitted to the Operations Committee of the Swiss Agency for Development
526 and Cooperation (DEZA) on 11 October 2001 [online]. www.deza.admin/themen
527 (Accessed 15/03/2014).
528
- 529 17. Holloway G, Nicholson C, Delgado C, Staal S & Ehui S. Agro-industrialization through
530 institutional innovation, transaction costs, cooperatives and milk market development
531 in the East African Highlands. *Agricultural Economics* 2000: 23(3), 279–88.
532
- 533 18. International Fund for Agricultural Development (IFAD). Promoting Market Access for
534 the Rural Poor in Order to Achieve the Millennium Development Goals. Discussion
535 Paper. IFAD. p. 42. 2003
536
- 537 19. Jayne TS, Govereh J, Mwanaumo A, Nyoro JK, Chapoto A. False Promise or False
538 Premise? The Experience of Food and Input Market Reform in Eastern and Southern
539 Africa. *World Dev.*, 2002: 30 (11): 1967-1985.
540
- 541 20. Key N, Sadoulet E & de Janvry, A. Transaction costs and agricultural household
542 supply response. *American Journal of Agricultural Economics* 2000: 82(1), 245–59.
543
- 544 21. Kherallah M, Kirsten JF. The New Institutional Economics: Applications for Agricultural
545 Policy Research in Developing Countries. *Agrekon* 2002: 41 (2): 111-134.
546
- 547 22. Knowler D, and Bradshaw B. "Farmer's Adoption of Conservation Agriculture: A
548 Review and Synthesis of Recent Research." *Food Policy* 2007: 32(1):25-48.
549
- 550 23. Lapar ML, Holloway G & Ehui S. Policy options promoting market among smallholder
551 livestock producers: a case study from the Philippines. *Food Policy* 2003:28:187-211.
552
- 553 24. Makhura M, Kirsten J & Delgado C. Transaction costs and smallholder participation in
554 the maize market in the Northern Province of South Africa. Seventh Eastern and
555 Southern Africa Regional Maize Conference, 11–15 February, 2001. Pretoria, South
556 Africa.
- 557 25. Martey E, Etwire PM, Wiredu AN & Wahaga E. Unpublished Report on Baseline
558 Survey of Sweet Potato Farmers in Northern Ghana under the project "Horticulture
559 CRSP Focus Project STOPS: Sustainable Technologies for Orange and Purple Sweet
560 Potatoes in Ghana". Report Prepared for Pennsylvania State University. 2013
561
- 562 26. Martey E, Annin K, Wiredu AN & Attoh C. Does Access to Market Information
563 Determine the Choice of Marketing Channel among Smallholder Yam Farmers in the
564 Brong Ahafo Region of Ghana? A Multinomial Logit Regression Analysis. *Journal of*
565 *Economics and Sustainable Development*. 2012: Vol.3, No.12, 2012
566
- 567 27. Matungul PM, Lyne MC & Ortmann GF. Transaction costs and crop marketing in the
568 communal areas of Impendle and Swayimana, KwaZulu Natal. *Development Southern*
569 *Africa*. 2001: 18(3):347-363.
570
- 571 28. Moser C, Barrett C, Minten B. Missed opportunities and missing markets: Spatial
572 temporal arbitrage of rice in Madagascar. Selected paper presented at the American
573 Agricultural Economists Association Annual meeting, Providence, Rhode Island, 2005.
574 July 24-27, 2005.
575

- 576 29. Nowak PJ. "The Adoption of Agricultural Conservation Technologies: Economic and
577 Diffusion Explanations." *Rural Sociology* 1987;52(2):208-220.
578
- 579 30. Ofori IM. Factors of Agricultural Growth in West Africa. ISSER, University of Ghana,
580 Legon, Accra, Ghana. 1973.
581
- 582 31. Okoedo-Okojie DU & Omoregbee FE. Determinants of Access and Farmers' use of
583 Information and Communication Technologies (ICTs) in Edo State, Nigeria. *J. Appl.*
584 *Sci. Environ. Manage.* 2012;Vol. 16 (1) 41 - 44 March, 2012
585
- 586 32. Olwande J, Mathenge M. Market Participation among the Poor Rural Households in
587 Kenya. Tegemeo Institute of Agricultural Policy and Development. 2010
588
- 589 33. Omiti JM, Otieno DJ, Nyanamba TO, Mccullough E. Factors Influencing the Intensity
590 of Market Participation by Smallholder Farmers: A Case Study of Rural and Peri-urban
591 areas of Kenya. *Afr. J. Agric. Res. Econ.*, 2009;3(1): 57-82.
592
- 593 34. Oparinde, LO and Daramola AG. Determinants of Market Participation by Maize
594 Farmers in Ondo State, Nigeria. *Journal of Economics and Sustainable*
595 *Development.*2014;Vol.5, No.1, 2014
596
- 597 35. Pingali P, Meijer M & Khwaja Y. Commercializing small farms: Reducing transaction
598 costs. 2005. www.ifpri.org/events/seminars/SmallFarms/ Accessed 10 March 2014.
599
- 600 36. Ramatu M. Al-Hassan, Irene S. Egyir and James Abakah. Farm household level
601 impacts of information communication technology (ICT)-based agricultural market
602 information in Ghana. *Journal of Development and Agricultural Economics.* 2013 Vol.
603 5(4), pp. 161-167, April, 2013
604
- 605 37. Randela R, Alemu ZG & Groenewald JA. Factors Enhancing Market Participation by
606 Small-scale Cotton Farmers. *Agrekon*, 2008. Vol 47, No 4
607
- 608 38. Republic of Ghana. The Ghana ICT for Accelerated Development (ICT4AD) Policy.
609 Ministry of Communication, Accra. 2003a
610
- 611 39. Republic of Ghana. Growth Poverty Reduction Strategy. National Development
612 Planning Commission, Accra. 2006.
613
- 614 40. Shepherd A. "Servicios de Información de Mercados: Teoría y Práctica." *Bulletin of*
615 *Agricultural Services* of the FAO No. 125, Rome, Italy. 2000.
616 <http://www.fao.org/ag/AGS/subjects/es/agmarket/misSp.pdf>
- 617 41. Shepherd, A. Market Information Services: Theory and Practice. FAO (Food and
618 Agriculture Organization), Rome. 1997.
619
- 620 42. Shiferawa BA, Kebede TA. and You L. Technology Adoption under Seed Access
621 Constraints and The Economic Impacts of Improved Pigeonpea Varieties In Tanzania.
622 *Agricultural Economics* 39 (2008) 309–323.
623 <http://onlinelibrary.wiley.com/doi/10.1111/j.1574-0862.2008.00335.x/abstract>.
624
- 625 43. Schultz TW. Agriculture in an unstable Economy. McGraw-Hill Book Company Inc.,
626 New York. 1945.
627

- 628 44. Sindi JK. "Kenya"s Domestic Horticulture Subsector: What drives Commercialization
629 Decisions for Rural Households?" A Published MPhil Thesis for the Award of Master of
630 Science Degree. Department of Agricultural, Food, and Resource Economics:
631 Michigan State University. 2008.
632
- 633 45. Southworth HM, Johnston BF. Agricultural Development and Economic Growth. 1967.
634 Cornell University Press, U.K.
635
- 636 46. Tracey-White J. "Planning and Designing Rural Markets". Marketing Extension Guide
637 2003: No. 4. Rome, Food and Agriculture Organization (FAO).
638
- 639 47. Vance C, Geoghegan J. Modeling the determinants of Semi-subsistent and
640 Commercial Land uses in an Agricultural Frontier of Southern Mexico: a switching
641 regression approach. Int. Regional Sci. Rev., 2004: 27(3): 326–347.
642

643 ABBREVIATIONS

644		
645	ABC	Agribusiness Centers
646	FFS	Farmer Field School
647	FLC	Farmer Learning Centers
648	FASDEP	Food and Agriculture Sector Development Policy
649	IFAD	International Fund for Agricultural Development

APPENDIX

651

Appendix 1: Truncated Regression Estimates of Agricultural Commercialization

653

Truncated regression

Limit: lower = 0

Number of obs = 126

upper = +inf

Wald chi2(14) = 107.22

Log pseudolikelihood = 41.229725

Prob > chi2 = 0.0000

yi	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
gend	-.0916385	.0419719	-2.18	0.029	-.1739018	-.0093752
adl	-.020067	.0119931	-1.67	0.094	-.0435731	.003439
agehh	.0021907	.0018273	1.20	0.231	-.0013907	.0057722
eduhh	.0271816	.0164764	1.65	0.099	-.0051115	.0594747
eduhh2	-.0027063	.001622	-1.67	0.095	-.0058853	.0004727
extacs	-.0053004	.0482512	-0.11	0.913	-.0998711	.0892703
assoc	.0599765	.0340319	1.76	0.078	-.0067249	.1266778
lansta	-.0840608	.0564533	-1.49	0.136	-.1947072	.0265855
fmsize	.1875422	.0538236	3.48	0.000	.0820499	.2930344
crdav	.0396305	.0361614	1.10	0.273	-.0312445	.1105056
lanaces	.0262066	.0064392	4.07	0.000	.013586	.0388273
dismkt	-.0041164	.0025967	-1.59	0.113	-.0092058	.0009731
ofmi	-.0199626	.0108591	-1.84	0.066	-.041246	.0013208
info	-.0014189	.0543367	-0.03	0.979	-.1079168	.105079
_cons	.4366075	.1120595	3.90	0.000	.216975	.65624
/sigma	.1770767	.0110312	16.05	0.000	.1554558	.1986975

654