

## DETERMINANTS OF THE CHOICE OF MARKETING CHANNEL AMONG COCOYAM FARMERS IN SOUTH EAST NIGERIA

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### ABSTRACT

Choice of market channels has been studied from different angles in the developing countries. However, model identifying the relative significance of household socio-economic and institutional attributes influencing channel choices of cocoyam at household level in South East Nigeria have never been estimated. In this study, discrete choice of multinomial logit model was used to estimate the market channel choices. Multistage sampling technique was used and data was collected from 300 small holder cocoyam farmers. Data for the study was collected from sampled market outlets in South east Nigeria between September 2015 and October 2016. Multinomial logit regression model (MNL) was used to analyze factors influencing the choice of marketing channels. The results of this study showed that age, storage costs, volume of cocoyam marketed, distance to the market, purpose of farming and farm size were found to significantly influence choice of household cocoyam market outlet. Households that incurred higher transaction costs in form of storage, transportation, handling more volume of cocoyam were more likely to sell through market channel 3 as oppose to local market where he or she sell to consumer in channel 1 as well as market channel 2 where he sells through semi-urban market. Therefore, the need for credit that will enable them to pay all the transaction costs needed to make high gross margin. Choice of channel 3 ensure high gross margins consequently credit to offset all the transaction costs will be the key in accessing the best marketing channel.

**Key words:** Marketing channel; Multinomial logit; Cocoyam farmers; South east Nigeria

### INTRODUCTION

Cocoyam (*Colocasia spp* and *Xanthosoma sagittifolium*) is an important cash crop that forms an integral part of the Nigerian diet, and is essential in ensuring food security among rural and urban households. The crop originated from Southeast Asia. It was introduced into Nigeria and other West Africa countries in 16<sup>th</sup> and 17<sup>th</sup> centuries (Bown, 2000). It is the third largest root and tubers in south-east Nigeria after cassava and yam in terms of production and acreage (Nwagbo, Okorji, and Ugwu, 1987; Onyeka, 2014). However, Nigerian with an estimated population of 173.6 million as at 2012 (The World Bank, 2013), its rural dwellers, that constitute a large proportion of its population and produce about 90% of its food supply, are poor (Gani and Adeoti, 2011). Considering the prominent role agriculture plays in the livelihood of these people, strategies aimed at reducing poverty and hunger centered on rapid growth in this sector.

To this end, the major challenges confronting development actors and governments agencies in recent decades have been about assisting smallholders to increase their market participation in order to take advantage of economic opportunities (Dorward, Kydd, and C., 2008; Greig, 2009; Kostov and Davidova, 2013; Zanella, 2012). In Nigeria, National effort to enhance the ability of small holders to participate in the market such

as Agricultural Transformation Agenda (ATA), Root and Tuber Expansion Program (R-TEP), National Food Security Program (NFSP), Commercial Agricultural Development Project (CADP) etc have been made. But unfortunately (The World Bank, 2013) report show that poverty, especially in rural areas, has increased in Nigeria from 47 million to 119 million.

Although the performance of the Nigerian economy as documented by (NBS, 2010; SMEDAN and NBS, 2013) showed that national GDP growth rate rose from 2005 to 2010 by 6.68%, but unfortunately the country had Human Development Index position of 153 out of 187 and unemployment is also highest at 41.6% among the age 15 to 24 (NBS, 2010) also the inequality rose to Gini Index<sup>2</sup> of 48.83 in 2010 ((The World Bank, 2013). Thus, growth achieved during the period might not have trickled down adequately and there are still areas of high poverty incidence. On the productivity of cocoyam, (Onyeka, 2014) report shows that gross production value of cocoyam in Nigeria declined from US\$1800 million in 2008 to US\$1100 million in 2011.

The income and economic welfare of the farmers are determined by agricultural prices, which in turn influences their farm investment and production decision (Gani and Adeoti, 2011). Different studies on agricultural product marketing had shown that farmers' decision for whom to sell is influenced by transaction costs (such as information negotiation and monitoring costs) and households' characteristics (like age,

education, family size etc) (Gabre-Madhin 2006; Baltenweck and Staal, 2007; Barret 2008; Dorward, Kydd, and Poulton, 2008; Xaba and Masuku, 2012). These factors make food crop marketing system inefficient in most African countries. As a result, farmers find it difficult to dispose of their produce at attractive prices and places of their choice due to perceived weaknesses in food crop marketing system. This orientation suggests that critical intervention assistance aimed to ensure broad-based, low cost access to competitive, well functioning markets including getting prices right requires significant investment by public sector (Ajala and Obiechina, 1987; Barret, 2008; FAOSTAT, 2010; Tiffin, Trail, and Mortimer, 2006). Despite the growing interests along this line, much less attention has been paid to cocoyam marketing. There is need to reduce transaction costs prevailing along the market chain by identifying cost-effective marketing channels and coordinated supply chains. This requires a proper understanding of how the market chain is organized and operates. The extent to which the small holders' cocoyam marketer is linked with market that give them the highest margin has not been well understood. Moreover, very limited empirical studies have documented on determinants of choice of cocoyam marketing channels in south east Nigeria. Therefore, the driving force for initiating this study is to contribute to the discussion on the need to enhance the income generating ability of cocoyam farmers by identifying factors influencing their choice of marketing channel. The study is built on the assumption that market participation decisions and choice of marketing channels are made in sequence where producers initially decide whether to sell or not, and then whom to sell. Therefore, to enhance the income of households, it is essential to investigate the factors influencing choice of marketing channels.

Therefore, this work drew insight from cocoyam marketing and asks: what contextual factors (socio-economic and institutional conditions) describe the agents participating in cocoyam marketing? What marketing/channels problems are associated with cocoyam? How do cultivators and middlemen frame their preferences for marketing channel choices and which factors determine the choice of marketing channels? Thus the main objective of this study is to analyze the key factors influencing the choice of marketing channels by cocoyam marketers. Stakeholders getting benefits from this study are rural producers and marketers, agricultural institutes, researchers and policy makers who will be furnished with information that could increase market access and reduce poverty.

This study represents a departure from the generally coarse and purely descriptive approach such as frequencies, cross tabulations, mean ratios adopted in several studies investigating the choice of marketing

channels in the face of growing constraint to scale up food value chains (Babatunde and Oyatoye, 2009; Hernandez, 2009; Emeka, Akogwu, Ugwu, and Chika-Emeka, 2014; Enete and Okon, 2012; Enwelu, Asogwa, Nwalieji, and Ezeano, 2014; Fadipe, Adenuga, and Raji, 2015). Study employed model built around data from cross-sectional surveys and interviews at a market-focused scale. The approach of the study identifies and integrates socio-economic and institutional conditions in a way that supports a constraint utility optimisation framework. This framework links choice of marketing channels to a set of socio-economic, technological and institutional constraints (Baltenweck and Stall, 2007; Barret, 2008; Greig, 2009; Jari, 2009; Kostov and Davidova, 2013; Mainville, 2004; Take, 2007; Takele, 2010; Zanello, 2012). The marketing channels' choice decision model represents an indirect choice-sets along a range of subjective utility levels (see Balsevich 2006) determined by conditional probabilities among marketing channels. Findings of the study are wide-ranging, suggesting how socio-economic and institutional characteristics influences market participations, particularly in terms of shifting their preferences from channel 1 which is subsistence channel where there is no intermediary between the market participant and he sells directly to consumer and to channel 3 which is commercial channel or where the marketing channel is integrated into wholesaler and retailers etc.

## MATERIALS AND METHODS

**Study area and data:** The study area is South-east geopolitical zone of Nigeria. Five states constitute this zone: Abia, Anambra, Ebonyi, Enugu, and Imo, covering latitude 4° 50' N to 7° 10' N and longitudes 6° 40' E to 8° 30' E. The zone spreads over a total area of 78,618 km<sup>2</sup>, representing 8.5% of the nation's total land area. The area has a total population of 16,381,729, (National Population Commission, 2007).

Three-stage sampling technique was employed for the study. In stage one, the study stratified each state within the zone based on whether it is within a cocoyam supply/surplus or a demand/deficit zone. In this sense, stratum 1 (cocoyam supply zone) includes Enugu, Ebonyi and Imo states, while stratum 2 (cocoyam deficit region) include Abia and Anambra states. The study selects a state from each stratum using a simple random sampling approach. This gave a total of two states – Enugu and Anambra – from where cocoyam markets and respondents were selected. To select markets (stage two), purposive sampling approach was used. Here, six markets (three urban and three rural cocoyam markets) were selected. The urban markets are Timber shed/Nsukka main market, Enugu main market and Onitsha main market while the rural markets are Nkwo Ibagwa market, Oric/Nkwo Opanda, and Nkwo Adazi Nnukwu. In stage

three, the study sampled respondents (stratified into producers, wholesalers and retailers) using a predetermined sampling frame drawn from the selected markets. Applying a random sampling approach, the study selected 300 producers from a frame of 5000 households; 180 wholesalers from 2600; and 300 retailers from 5300. Overall, the study sampled 780 respondents whose responses formed the data used in the study. (Table 1 and 2 in result section has been corrected and changed to 780)

Data collection was undertaken during 2015 and 2016, and primarily involved administration of three sets of different structured questionnaires to each category of respondents, including using open ended questionnaires for focus group discussions. Secondary data were collected from journals, periodicals from Food and Agricultural Organization, International Food Policy Research Institutes, United Nations, World Bank, National Root Crop Research Institute, Umudike, conference proceedings, thesis, books and the opinions of experts in the field of produce marketing as way to triangulate our findings. We combined descriptive statistics and perspective along the analytical framework presented in section 2 to analyze our data (using STATA).

**Analytical framework and Empirical Model:** Smallholder market behavior in the context of produce marketing can be understood by examining choices of marketing channel for output market in a constraint utility optimization framework where an individual is assumed to maximize market participation in terms of market channel selection subject to a set of socio-economic and institutional constraints. The framework is couched around market channels (channel 1, channel 2, and channel 3) in a market environment where transactions on varying quantities of cocoyam take place. Producers in this context are categorized based on their selection for either channel 1 or channel 2 or channel 3, and depending on their inherent marketing goals, including socio-economic and institutional characteristics that influence their choices. Market channel choice decision is presented in the frame of a Multinomial logit regression model. Here the dependent variables are defined to have three possible conditional (choice) probabilities across channel 1, channel 2 and channel 3 (i.e. the three-channel choice used in this study). The conceptual foundation for choice models is often appropriate for modeling discrete choice decisions such as the case of this study. In model implementation, market channel choices are modeled with a three-equation system. Thus, a set of coefficients  $\beta^{(1)}$ ,  $\beta^{(2)}$ ,  $\beta^{(3)}$ , corresponding to three possible options steps 1, 2, 3 in marketing channels can be estimated as:

$$\Pr(Z = 1) = \frac{e^{x\beta^{(1)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}} \dots\dots\dots (1)$$

$$\Pr(Z = 2) = \frac{e^{x\beta^{(2)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}} \dots\dots\dots (2)$$

$$\Pr(Z = 3) = \frac{e^{x\beta^{(3)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + e^{x\beta^{(3)}}} \dots\dots\dots (3)$$

The model, however, is unidentified in the sense that there is more than one solution of  $\beta^{(1)}$ ,  $\beta^{(2)}$ ,  $\beta^{(3)}$ , that lead to the same probabilities for  $Z=1$ ,  $Z=2$  and  $Z=3$ . To identify the model, one of  $\beta^{(1)}$ ,  $\beta^{(2)}$ ,  $\beta^{(3)}$  is arbitrarily set to zero. That is if we set  $\beta^{(3)} = 0$  the remaining coefficient

$\beta^{(1)}$ ,  $\beta^{(2)}$ , would measure the change in relative to the  $Z = 3$  group. In other words, we would be comparing the most vertically differentiated channel (3) with the less differentiated ones (1 and 2). Then setting  $\beta^{(3)} = 0$ , the above equations (1) to (3) become:

$$\Pr(Z = 1) = \frac{e^{x\beta^{(1)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + 1} \dots\dots\dots (4)$$

$$\Pr(Z = 2) = \frac{e^{x\beta^{(2)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + 1} \dots\dots\dots (5)$$

$$\Pr(Z = 3) = \frac{e^{x\beta^{(3)}}}{e^{x\beta^{(1)}} + e^{x\beta^{(2)}} + 1} \dots\dots\dots (6)$$

The relative probability of Z = 1 to base category is given as:

$$\frac{\Pr(Z = 1)}{\Pr(Z = 3)} = e^{x\beta^{(1)}} \dots\dots\dots(7)$$

If we call this the relative likelihood and assume that X and  $\beta_k^{(1)}$  are vectors equal to (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>... X<sub>k</sub>) and ( $\beta_1^{(1)}$   $\beta_2^{(1)}$  .....  $\beta_k^{(1)}$ ) respectively. The ratio of relative

likelihood for one unit change in X<sub>1</sub> relative to the base category is then:

$$\frac{e^{\beta_1^{(1)} X_1 + \dots + \beta_1^{(1)} (X_1 + 1) + \dots + \beta_k^{(1)} X_k}}{e^{\beta_1^{(1)} X_1 + \dots + \beta_1^{(1)} X_1 + \dots + \beta_k^{(1)} X_k}} = e^{\beta^{(1)}} \dots\dots\dots(8)$$

Therefore the exponential value of a coefficient is the relative likelihood ratio for unit change in corresponding variable as reported by (Enete, 2003; Pundo and Fraser, 2006). Considering that producers make decisions regarding which buyers for selling their production (for example consumers in channel step 1; retailers in channel step 2 or wholesalers in channel step 3). Thus if Z<sub>1</sub>, Z<sub>2</sub>, Z<sub>3</sub> are the dependent variables representing (channel step 1), which denotes channels where the farmer sells directly to the consumer; (channel step 2), denoting channels where only one marketing intermediary came between the farmer and the consumer; and (channel step 3), which denotes channels where more than one intermediary came between the farmer and the consumer. The latter category is where the marketing channel has vertically differentiated into specialized functions like wholesale and retail. Then Multinomial logit model will be fitted to test how dependent variables: step1, step 2 and step 3 channels can be explained by some independent variable x<sub>j</sub>s.

X<sub>15</sub> = Sources of finance (Self, formal, friends and relatives, NGOs)

X<sub>16</sub> =;  $\mu$  = error term

The justification for inclusion of these variables is as follows. Farmers' age is used to account for his/her experience and it consequent influence in market participation, where the results in the literature are mixed. Although (Zanello, 2012) conclude that older farmers tend to participate in the market due to their experience in farming compared with the younger peers in Ghana, (Xaba and Masuku, 2012) conclude otherwise for Swaziland.

Use of the education level of the farmer as a market participation shifter is common (Zivenge and Karavina, 2012; Emeka *et al.*, 2014; Enete and Okon, 2012; Enwelu *et al.*, 2014; Fadipe *et al.*, 2015). The education variables is also used as a surrogate for a number of factors. At the marketing level, access to information as well as the capacity to understand marketing mix is expected to improve with education, thereby, influencing market participation. Surprisingly, there were mix results on the effect of education on market participation of cocoyam in Nigeria. For instance (Enete and Okon, 2012) did not find any insignificant effect of education on market participation while (Gani and Adeoti, 2011) concluded that education of the household matters in increasing market participation.

**The empirical model:** The independent variables are the following socio-economic factors that were hypothesized as possible determinants of the producers' choice of marketing channels.

$$Z_1 = (F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, \dots, X_{16}) + \mu \dots\dots (9)$$

$$Z_2 = (F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, \dots, X_{16}) + \mu \dots\dots\dots (10)$$

$$Z_3 = (F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, \dots, X_{16}) + \mu \dots\dots (11)$$

- Where
- X<sub>1</sub> = Age of producer (in years)
  - X<sub>2</sub> = Gender of market participant (0 or 1)
  - X<sub>3</sub> = Levels of education (in years);
  - X<sub>4</sub> = Access to extension agents (0 or 1)
  - X<sub>5</sub> = Need for credit (0 or 1)
  - X<sub>6</sub> = Processing costs (in \$)
  - X<sub>7</sub> = Storage costs (in \$)
  - X<sub>8</sub> = Purpose for farming (0 or 1).
  - X<sub>9</sub> = Households' size (No. of members)
  - X<sub>10</sub> = Volume marketed (number of 100kg bag)
  - X<sub>11</sub> = Distance to market (in km)
  - X<sub>12</sub> = Access to market information on price (0 or 1)
  - X<sub>13</sub> = Size of land holdings (ha)
  - X<sub>14</sub> = Income from other sources (in \$)

Another key question of interest is whether market participation are related to the transaction costs such as (distance to market, family labour, land allocation to cocoyam, volume marketed, need for credit, storage costs, processing costs, access to market information), as literature on these issues are mixed (Gabre-Madhin 2006; Baltenweck and Staal, 2007; Barret 2008; Dorward, Kydd, and Poulton, 2008). The expectation is that farmers with lower transport cost participate in market and sold more because they were likely to recover their production and marketing costs (Xaba and Masuku, 2012) and (Gani and Adeoti, 2011). Surprisingly (Lapar, 2003) reported that better access to roads, markets or towns might increase the opportunity cost of labour and capital in agricultural production and marketing (especially where alternative opportunities exist and the return to labour and capital are higher) and might in turn reduce (hence negative effects) for participation and

sales. Market access would be improved with an increase in the flow of market information to the farmer, to broaden the information base of the farmer and reduce dependent on social capital, that is neighbors' friend and relations (Gani and Adeoti, 2011).

## RESULTS AND DISCUSSION

**Description of the socio-economic characteristics and institutional variables:** Table 1 shows the descriptive statistics of variables that characterized the sampled households in the study sites. Households' marketing choices are varyingly influenced by these variables. The table described the age, educational level, gender, household size and marital status.

**Age:** It can be observed that the age distribution of the sample was skewed towards the upper age group of 40 and above indicating that there were relatively high proportions of middle age respondents participating in the cocoyam markets. Less than 16% of respondents were

below 40 years. The cultivator/producers below 40 years were 11%; that of wholesalers were 5% and retailers 24%.

**Education:** Levels of education affect the level of participation in cocoyam markets. From Table 1, 24% of respondents had no formal education starting from 10% of wholesalers to 28% of producers. On the other hand 33, 35 and 6 percent of the respondents attended primary, secondary and tertiary education, respectively.

**Gender:** With respect to gender Table 1 shows that 37% of the interviewed participants were male while 63% were female.

**Household size:** Household sizes are generally larger among the retailers where 63% have between 7 and 9 people in their family. The percentage of wholesalers with household size of between 7 and 9 people were 37% while that of farmers were 24%. The majority of the marketers among the producers, wholesalers, retailers were married (87%) while 13% were single.

**Table 1. Socio-economic characteristics of market participants that affect market systems.**

Characteristics	Producers (n = 300)	Wholesalers (n= 180)	Retailers (n = 300)	Total (n = 780)
Age of Players				
21- 30 years	21 (7)	0(0)	18(2)	27(3.46)
31- 40 years	12(4)	15(8.3)	66(22)	63(11.93)
41- 50 years	144(48)	141(78.4)	495(55)	450(57.69)
51- 60 years	108(36)	24(13.3)	58(19)	189(24.23)
>60 years	15(5)	0(0)	6(2)	21(2.69)
Educational Level				
No formal Education	84(28)	30(16.7)	75(25)	189(24.23)
Primary education	72(24)	69(38.3)	138(46)	279(35.76)
Secondary Education	114(38)	72(40)	72(24)	258(33.07)
Tertiary Education	30(10)	9(5)	15(5)	54(6.92)
Gender				
Male	264(88)	15(8.3)	4(4)	291(37.3)
Female	36(12)	165(91.7)	288(96)	489(62.7)
Household size				
1-3	42(14)	6(3.3)	12(4)	60(7.69)
4-6	177(59)	54(30)	90(30)	321(41.16)
7-9	72(24)	111(61.7)	189(63)	372(47.69)
>9	9(3)	9(5)	9(3)	27(3.46)
Marital status				
Single	57(19)	3(5)	30(10)	96(12.31)
Married	243(81)	171(95)	270(90)	684(87.69)

Source: Field survey 2015/16; Figure in parentheses are percentages.

**Institutional conditions that influences marketing participation:** Table 2 shows the descriptive statistics of Institutional conditions that influences marketing participation in the study sites. Households' marketing

choices are varyingly influenced by access to extension services, need for credit, and sources of finance.

**Extension services:** Only about 67% of farmers, 3.3% of wholesalers and 15% of retailers have access to extension agents (Table 2). This data shows that in south

east Nigeria, the majority of marketers, especially wholesalers and retailers, have no proper linkages with the extension services. This results in lack of market information on prices, credits and grades and standards

Credit access: Credit is one of the business support services, especially for participating in market. Table 2 shows the major players among formal and

informal financial institutions. Governments' Microfinance institution is weak in south east Nigeria and that is why their role in lending to the respondents (7%) is smaller relative to Non-Governmental Organization that lent money to 26% of marketers, as shown in Table 2.

**Table 2. Institutional conditions that influences marketing participation.**

Socio-economic variables	Producers (n=300)	Wholesalers (n= 180)	Retailers (n=300)	Total (n=780)
Extension service				
Access to extension services	201(67)	18(3.3)	45(15)	252(32.3)
No access to extension services	99(33)	174(96.7)	255(85)	528(67.7)
Need for credit				
Need for credit	234(78)	147(81.7)	207(69)	580(75.38)
No need for credit	66(22)	33(18.3)	93(31)	192(24.62)
Sources of finance				
Personal savings	183(61)	51(28.3)	240(80)	474(60.77)
NGO	84(28)	99(55)	21(7)	204(26.16)
Friends and relatives	21(7)	12(6.7)	12(4)	45(5.77)
Microfinance institution	12(4)	18(10)	27(9)	57(7.30)
Membership of co-operatives				
Member	186(62)	168(93.3)	18(6)	372(47.70)
Not a member	114(38)	12(6.7)	282(94)	408(52.30)

Source: Field survey, 2015/2016. Figure in parentheses are percentages.

**Diagnostic test for Multinomial Logit and correlation coefficient of some variables:** Before subjecting data for multinomial logit analysis several econometric issues needed to be addressed prior to estimation. The pair-wise correlations among independent variables were examined to find out those variables that will affect the model. The independent variables that can affect the model were removed from the model. This also eliminates potential multicollinearity among explanatory variables. An analysis of variance inflation factor (VIF) did not also show any problem.

The assumption of independence is critical and leads to substantial computational difficulties involving in computation of multivariate integrals. If there is a change in the characteristics of any other alternative in the choice set, this property requires that the two probabilities must adjust precisely to preserve their initial ratio, that is, the percentage change in each probability must adjust precisely to preserve their initial ratio, that is, the percentage change in each probability should be equal. A Hausman test was carried out and showed no evidence that the study did not meet IIA assumption and therefore no need of using nested logit as alternative.

**Results of Multinomial Logit Regression:** This section presents the results of the multinomial logistic model and discusses results of significant variables that determine choice of marketing channels in South-East Nigeria. The variables in Table 3 were considered and tested for their significance. The multinomial logistic results of no intermediary (channel step 1) i.e. selling directly to consumer in local market and one intermediary (channel step 2) i.e. selling to retailers in semi-urban market as compared with more than one intermediary (channel step 3) i.e. selling to wholesalers in distant and urban market where the small holders could make the highest gross margin were presented in Table 3. The table shows the estimated coefficients ( $\beta$  values), standard error, and significant values (P) of independent variables in the model.

The estimated coefficients ( $\beta$  values) measure the expected change in the logit for a unit change in each independent variable, all other independent variables being constant. The sign of the coefficient shows the direction of influence of the variable on the logit. It follows that a positive value indicates an increase in the likelihood that a household will change to the alternative option for the baseline group. A negative value shows

that it is less likely that a household will consider the alternative. Therefore, in this study, a positive value in no

intermediary implies an increase in the likelihood of remaining in no intermediary.

**Table 3: Multinomial Logistic regression result for determinants of cocoyam market choice.**

Variables	No intermediary (channel 1)			One intermediary (channel 2)		
	Coef.	Std. error	Sig (p)	Coef.	Std err	Sig (p)
AGE	-.4277639	.1685738	0.011 **	-.0345489	.0883651	0.696
SEX	-50.29594	1.35e+09	1.000	-44.36659	1.53e+09	1.000
EDU	-.3110898	0.1860933	0.257	-.0398975	.0806156	0.621
EXS	-.4909272	1.704001	0.773	1.289409	1.042368	0.216
SC	-.0222996	0.0077701	0.003 ***	-.0999755	.0003928	0.013 **
PC	-.0001659	0.006167	0.778	-.000281	.0003055	0.358
ICTA	-43.42289	8.80e+08	1.000	-45.26626	8.90e+08	1.000
HS	-.0011654	0.0066501	0.798	-.0001533	.0001251	0.345
VOL	-.1418745	0.0565432	0.003 ***	-.0342453	.0001321	0.002 ***
MRD	-.0312786	0.4565432	0.009 ***	-.0532453	0.017842	0.022 **
MPURPO	-.7910506	0.3567832	0.039 **	-.1289342	0.095641	0.044 **
LS	-1.970991	0.5328932	0.043 **	-.2378609	0.564321	0.036 **
NFINC	44.38765	0.7865465	0.996	42.98123	0.0342678	0.745
Cons	29.38213	11.04304	0.008	6.271686	5.595692	0.262

Statistics  $\chi^2 = 71$ ; Prob.  $> \chi^2 < 0.001$ ; Pseudo  $R^2 = 0.859$ . No of obs. = 300.

Note: Channel step 3 or more than one intermediary is the comparison group. \*\*\* denote  $P < 0.01$ ; \*\* denote  $P < 0.05$ ,

Source: Field survey 2015/2016.

The significant values (also known as p-value) show whether a change in the independent variable significantly influences the logit at a given level. In other words, the degree to which choosing channel step 1, step 2 or 3 can be explained by household heads' personal characteristics, transaction costs or institutional characteristics. In this study, the variables were tested at 1% and 5% significant levels. Thus, if the significant value is greater than 0.01 and 0.05, then it shows that there is insufficient evidence to support that the independent variable influences a change away from the baseline group. If the significant value is equal or less than 0.01 or 0.05, then there is enough evidence to support a claim presented by the coefficient value. The standard error in the value measures the standard deviation of the error in the value of a given variable.

As indicated in Table 3, some predictor variables influenced market channel choices significantly. Of the 12 independent variables used in the model, six variables in the local market or channel step 1 and five variables in channel step 2 are statistical significant at 1% and 5% significant level.

**Age:** age of marketer was negatively related to choice of (local market or channel step 1) over (channel step 3) that is selling cocoyam to wholesalers who sell to retailers and then to consumers in urban market. Age was significant at 5% level of significance. This means that there is probability that as marketers' age increases his or her likelihood of changing from selecting channel 1 which is subsistence oriented to the baseline group which

is channel 3 which is commercial oriented increases. This relationship was statistically significant in changing from selecting market channel step 1 to selecting market channel 3 but negative and not significant in changing from selecting channel step 2. The result of age is in agreement with that of (Zanello, 2012) since he also conclude that older farmers tend to participate in the market due to their experience in farming compared with younger peers in Ghana.

**Storage costs:** the results found a negative relationship between the storage costs and choice of local market or channel step 1 as against channel step 3, and selling through channel 2 as against channel 3, the probability that producers incur higher storage costs were significant at 0.01% and negatively related with channel step 1 as well as channel step 2 and positive with channel 3. These implied that as the household increases the storage costs the probability of changing from selling through channel 1 and 2 to selling through channel 3 increases at 1% significant level. Surprisingly, literature on the effect of storage costs on market participation revealed that with lower storage costs, farmers tend to increase market participation (Gabre-Madhin 2006; Baltenweck and Staal, 2007; Barret, 2008; Dorward, Kydd and Poulton, 2008). The justification for their results is that farmers are likely to recover their production and marketing cost with lower storage costs. However this result revealed that for small holder farmers to engage in high value market they must incur high storage costs. This is true as they needed more money to enable them access distant market.

**Volume of cocoyam marketed:** the result of this study shows a negative relationship of choice of local market or step 1 channel over urban market or channel step 3. An increase in total volume of cocoyam output by 1 percent reduces the probability of those households selling its cocoyam through the local market as compared to through an urban market or channel step 3 by 14%. An increase in total volume of cocoyam output by 5% also reduces the probability of selling through channel step 2 by 3%. This is consistent with apriori expectation since there is costs reduction because of economy of scale. This result shows that cocoyam farmers who produce small volume of cocoyam simply sell to consumer in the local market to avoid transport costs.

**Marketing distance (MRD):** marketing distance significantly influenced the choice of cocoyam marketing channel at 1% level of significance. A unit increase in distance to market reduces the likelihood for such a household selling its cocoyam through the local market or channel step 1 over distance urban market by 3%. A unit increase in distance also reduces the likelihood of household selling through channel step 2 over channel step 3 at 5% significant level. The longer the distance, the higher the transport costs. However, the channel which is associated with higher transport costs increases selling price as well as gross margin. However, the finding of this work did not support that of (Xaba and Masuku, 2012). They revealed that higher transaction costs significantly reduced the participation of small holders in the market.

**Purpose of marketing (MPURPO):** There was a positive relationship between choice of urban market or channel step 3 or baseline category over selling through channel step 1 and 2. Purpose of marketing increased the household likelihood of selling its cocoyam through channel step 3 or urban market over channel step 1 and 2 at a significant of 5%.

**Land size allocated to cocoyam:** The size of cocoyam farm possessed by household was negatively related to choose of local market and semi-urban market or channel step 1 and channel step 2 over urban market or channel step 3. As the land size allocated to cocoyam increases by 1 acre, the likelihood of that household selling its cocoyam through the urban market or channel step 3 increases as compared to channel step 1 and channel step 2 by 1.97 units and 0.24 units respectively. This explains that farmers who have large cocoyam farm were likely to sell their cocoyam through market channel 3 as compared to famers with small cocoyam farm sizes.

From the results in Table 3, based on the multinomial logit model used, the  $R^2$  value of the model is 0.85 implying that the independent variables in the model explained only about 85% of the variability in the choice of marketing channels by producers. Specific

deductions are made using the P-value or significant levels of each of the independent variables.

**Conclusion and Recommendations:** The results of this study affirm that age, storage costs, volume of cocoyam marketed, distance to the market, purpose of farming and farm size were found to significantly influence choice of household cocoyam market outlet.

Households that incurred higher transaction costs in form of storage, transportation, handling more volume of cocoyam were more likely to sell through market channel 3 as oppose to local market where he or she sell to consumer in channel 1 as well as market channel 2 where he sells through semi-urban market. This study shows the need to provide financial support to small holders. So that they can access the best market channel that will increase the selling price as well as gross margin. Therefore, the need for credit that will enable them to pay all the transaction costs needed to make high gross margin.

These results are similar to past studies on marketing constraints (eg Gabre-Madhin 2006; Barret 2008; Dorward *et al.* 2008), particularly on the need to get institutional capacities right in order to enhance market participation. This study empirically shows the significance of certain contextual factors, e.g. rural-urban linkages, as well as transaction costs for scaling up food chain, in helping farmers to overcome the problems of transaction costs and marketing distances associated with marketing in West Africa. However, to clarify pin down the characteristics effects of the identified variables on the choice of marketing channels beyond the study location, particularly in terms of broader concerns for food commercialization in Africa, suggest an opportunity for further research. Similarly, further research can investigate the implication of our explanatory variables to direct market orientation across the subsistence-to-commercial marketing spectrum in West Africa. There is also the need for research on the costs and return of the various value chains of the major marketing channels. Such inquiry may focus on ways to increase participation in the market, reduce losses after harvest and enhance standard of living of small holder farmers.

Overall, the study recommends that the farmers should have access to rural credit to encourage greater efforts towards commercializing of cocoyam. The spill-over effect from this can translate into improve the standard of living of smallholders. Research and investment in cocoyam should be encouraged by government to reduce the incidence of diseases outbreaks in the field and to alleviate poverty.

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