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Full Length Research Paper

Trade Potential factors Affecting Hired labour Adoption in Yam Production in Ghana

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This paper examines the levels of family and hired labour use and the trade potential factors that influence the adoption of hired labour in Kpandai District in Northern Ghana. Empirical measure of the level of labour use among 510 sampled yam farm households revealed that hired labour dominate (63.9%) yam production among farm households. Furthermore, the paper estimate a logit model which identify that trade factors that were important in explaining the likelihood of hired labour use include producer price, farm size, competition among households, market integration, and cost of transportation. It is therefore recommended that a deliberate policy should be developed in order to improve the income levels of these labours to ensure the effective maintenance and continuity of hire labour use. Furthermore, policies should be developed to incorporate labour saving technologies to reduce the cost of yam production.

Keywords: hired labour, family labour, farm household, trade potential factors,

INTRODUCTION

Labour is a cardinal asset for farm households in rural agricultural communities of Ghana. Labour available to household defines the human capital that becomes the basis for farm household input use in production. The size of labour force in a country is determined by the number of people in the age group of 15-59 years as generally children below 15 years and old people above 59 years do not participate in production activity (Nagaraj, 2007). In the context of yam production in Ghana where farm mechanization is virtually nonexistent and all farm work is done manually, having access to the necessary labour for production directly affects the levels of household farm output, income, and orientation in market economies. One of the major inputs in growing yams is that of labour, which has been estimated to account for as much as 30 per cent (Marchand and Girardot, 1999), 40 per cent (Nweke *et al*, 1991), or 54 per cent (ICRA, 1996) of total operating costs. Moreover, labour use in yam is estimated to be in excess of 400 person-days per hectare per annum under most systems nearly twice that of cassava and more than six times that of maize (FAO, 1998). Most of the labour input is used in land preparation - making the mounds in which the yams are planted and grow, since no mechanical system of mound preparation has yet been developed (although minisetts can be and are planted on the ridges produced by ploughing; there is no data on how widespread this practice is). Moreover, labour (more than 10 per cent) are required for training yam vines along stakes, a practice, which has been shown to increase yields (Dorosh, 1988). Labour is also used for weed control; an increasingly important task for maintainig soil fertility. Labour used for these activities is basically either family or hired labour.

Over the years, family labour has dominated yam production however the change in economic environment due to trade liberalization and its related policies have changed this assertion. Recently this assertion is addressed with mixed feelings in the yam subsector of Ghana. The use of hired labour is gaining more space in terms of labour use in the country. Not surprisingly, casual labour is commonly hired by farmers (Langyintuo, 1996) due to the economic environment the subsector has been exposed to by trade factors. Such change in rate of labour hiring indicates a possible labour constraint in Ghana's agricultural production (OECD, 2010). Moreover, access to family labour recently is difficult due to the growing strength of education and rural urban migration. What's more, most farmers' attitude towards yam production is gradually

Table 1: Description of variables used in the Empirical model

Variable	Definition and Measurement of Variables	Hypotheses
Export (X_i)	Quantity of direct sales to export agents and/or to middle men who also sell to export agents	+
Market integration (I_i)	Quantity of yam sold in the production season	+
Consumers complaints (C_i)	Ability and willingness to address consumer complains. 1, if Yes and 0 otherwise	+
Outlet of sales (O_i)		
farm gate (O_f),	Quantity of yam sold at farm gate	+
village market (O_v)	Quantity of yam sold at village market	-
urban market (O_u)	Quantity of yam sold at urban market	+
Market Proximity		
urban market (D_i)	The time (hours) taken to transport yam from the farm to the urban market using lorry	-
Competition (Q_i)	Number of yam suppliers in the area	+
Producer Price (P_i)	The average price of hundred tubers if yam	+
Farm size (S_i)	The acreage of yam farm under cultivation	+/-
Time of Marketing		
Sales before market season (T_b)	Quantity of yam tubers sold before market season	+
Sales during market season (T_d)	Quantity of yam tubers sold during market season	+/-
Sales after market season (T_a)	Quantity of yam tubers sold after market season	+
Producer Price (P_i)	The selling price of hundred tubers of yam	+
Cost of Transport (R_i)	The average cost of transporting hundred tubers of yam	-

Source: field survey, 2012

shifting from subsistence to commercial and would not compromise on the use of family labour where high efficiency is not always assured. Therefore, the patronage for hire labour is becoming common among farming communities in the quest of gaining competitive advantage while meeting consumer demands and preferences.

This paper therefore explores the two major sources of labour supply (thus family and hired labour) in yam production. Based on a survey, the study examines the levels of family and hired labour use by farm household in Kpandai district of Ghana. The study further highlights the trade related factors that affect the adoption of hired labour. Understanding and knowing the levels and trade potential factors affecting the use of labours can further insight be developed concerning strategies to promote the adoption of hired labour in the yam production.

METHODOLOGY

Theoretical Model

For the sake of mathematical simplicity, the logit model is employed within the framework of this analysis (Field,

2000; Nnadi and Akwiwu, 2007, Greene, 2008, Maliki *et al*, 2009). This model makes it possible to predict the decision to adopt seed yam innovation and not to adopt. Thus the decision to adopt lies between zero (0) and one (1). The model also caters for the problem of heteroscedasticity. The model can be presented by the following equation:

$$E(y_i) = P(y_i) = \frac{1}{1+e^{-z}}$$

Where,

$P(y_i)$ is the probability for a household i for adopting an seed yam innovation;

$P(y_i)$ = 1 if technology is adopted and 0 if technology is not adopted.

e is an exponential function

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + \varepsilon_i$$

Where β_0 is the intercept

$\beta_1, \beta_2 ... \beta_n$ are the estimated coefficients of the corresponding variables

$X_1, X_2 ... X_n$, $X_1, X_2 ... X_n$ are independent variables specifying innovation.

The error term is represented by ε_i

Empirical Model of the study

The study was conducted in Kpandai District of Northern Ghana in 2012. Multistage sampling was employed in the study. The first and second stages were purposive selection of the region (Northern) and the district (Kpandai) because of their respective massive yam production relative to other regions and districts. Also, more than 50% of the farm households in the district are engage in yam production. The district consists of four major Agricultural Zones namely; Kpandai, Katiejieli, Jamboi and Ekumidi. In the third stage, the study included all the zones in the survey in order to get representative sample from each zone in the district. In the fourth stage, within each Agricultural zone four (4) communities were randomly sampled except Katiejieli where five communities were randomly sampled because the number of communities engaged in yam production in the zone was many relative to the other zones. The total number of communities that were sampled was seventeen (17). The random sampling technique was again employed in stage five to select thirty (30) farm households within each selected community. In all 510 farm households were selected and interviewed using structured questionnaires. The data collected include seed yam innovations and characteristics of farmers towards trade liberalisation and its related policies. The data collected were analysed using both the descriptive statistics such as mean, percentage, frequency distribution and standard deviation. The econometric tool such as the binary logit regression analysis was used. The model used is implicitly presented as:

$$Y = f(X, I, C, O, D, Q, P, T, S, R)$$

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 I_i + \beta_3 C_i + \beta_4 O_i + \beta_5 D_i + \beta_6 Q_i + \beta$$

Where:

$$Y_i = \begin{cases} 1 \text{ if household used mainly hired labour and} \\ 0 \text{ if household used mainly family labour} \end{cases}$$

Export (X), Market integration (I), Consumers complains (C), Outlet of sales (O), Market Proximity (D), Competition (Q), Producer Price (P), Time of Marketing (T), Farm Size (S); Cost of Transportation (R_i), Intercept (β_0), Estimated parameters ($\beta_{1...10}$) Error term (ε_i) table 1 above.

RESULT AND DISCUSSION

Description of the farm house hold based on trade potential characteristics Producer Price:

As indicated in Table 3 below producer price of yam of the sample respondents ranged from GH₵ 0.50 to GH₵ 4 for a tuber of yam while that of a “batch of yam” was GH₵50 to GH₵400. The mean selling price of a group of 100 tubers of yam (batch of yam) of the sample household was GH₵141.63 with standard deviation of 57.80.

Degree of Integration into market economy

From Table 3 below it can be depicted that, the total number of yam sold by sample households vary from 100 to 75000 tubers. Moreover, the average degree of integration of sampled farmers into the market economy was 13721 (76.01%) tubers of yam with a standard deviation of 13067 (15.96).

Export

Furthermore, the quantity of yam exported by sampled households ranges from 0 (0%) to 20000 (70.18%) tubers with mean of 1404 (7.50%) and a standard deviation of 3056 (13.6%).

Table 2: Distribution of households in relation to consumers/ customer complaints

Handling consumer complaints	Freq	% (N=510)
Households that received/heard complaints on the quality of yam	493	96.67
Households with the ability and are willing to address complaints	274	53.73

Source: Field survey, 2012

Table 3: Distribution of farm households according to trade potential characteristics

Trade potential characteristics	Mean	SD	Min	Max
Producer Price of yam				
A tuber of yam (GH₵)	1.39	0.59	0.5	4
A batch of yam (100 tubers of yam) [GH₵]	141.63	57.8	50	400
Market integration				
Tubers of yam sold (number of tubers)	13721	13067	100	75000
Tubers of yam sold (%)	76.01	15.96	10.26	100
Quantity of yam for export				
Total yam exported (No. of tubers)	1404	3056	0	20000
Total yam exported (%)	7.5	13.26	0	70.18
Outlet of Sales				
Tubers of yam sold at farm gate	3353	7548	0	53000
Tubers of yam sold at farm gate (%)	16.03	25.73	0	100
Tubers of yam sold at village market	1216	2567	0	19000
Tubers of yam sold at village market (%)	16.45	29.88	0	100
Tubers of yam sold at urban market	9154	8747	0	50000
Tubers of yam sold at urban market (%)	67.52	33.45	0	100
Competition among yam suppliers	10	6	1	40
Time of marketing				
Tubers of yam sold before market season	1922	5376	0	52000
Tubers of yam sold before market season (%)	10.4	19.84	0	100
Tubers of yam sold during market season	8090	7652	0	48500
Tubers of yam sold during market season (%)	67.19	35.66	0	100
Tubers of yam sold after market season	3715	7544	0	47200
Tubers of yam sold after market season (%)	22.42	32.41	0	100
cost of transportation	27.46	6.94	17	45

Source: Field survey, 2012

Addressing Consumers complaints

Among the sampled households, 493 (96.67%) of them received complaints on their produce nonetheless only 274 (53.73%) of them were willing and have the ability to address the needs and complaints of customers (see Table 3 above).

Outlet of Sales

The quantity of yam sold at the farm gate ranges from zero to 53000 tubers, with a mean number of tubers of 3353 (16.03%) and a standard deviation of 7548 (25.73). Likewise, the quantity of yam sold at village markets ranges from zero to 19000 tubers, with an average number of tubers of 1216 (16.45%) and a standard deviation of 2567 (29.88). Similarly, the number of yam sold at urban markets varies from zero to 50000 tubers, with an average number of tubers of 9154 (67.52%) and a standard deviation of 8747 (33.45).

Market Proximity

Farmers that sold their produce in the urban market spent between 10hrs to 26hrs on roads with an average time of 17hrs and standard deviation of 4.78.

Competition among yam farm households

From Table 3, it was observed that competition among farmers' ranges from 1 to 40 farmers with mean competition of 10 farmers and a standard deviation of 6. The impression deduced was that for every farmer in the study area there were ten (10) farmers surrounding him or her that were equally involved in the supply of yam. This put a lot of pressure on a farmer to produce to meet the needs and specifications of consumers in order not to lose customers to the other ten (10) farmers.

Time of marketing:

Shifting the direction of the discussion to Table 3, the quantity of yam sold before the main market season varies from zero to 52000 tubers, with a mean number of tubers of 1922 (10.40%) and a standard deviation of 5376 (19.84). Similarly, the quantity of yam sold during the main market season ranges from zero to 48500 tubers, with an average number of tubers of 8090 (67.19%) and a standard deviation of 7652 (35.66). What's more, the number of yam sold after the main market season varies from zero to 57400 tubers, with an average number of tubers of 3715 (22.42%) and a standard deviation of 7544 (32.41). Households selling their produce before and after the main market season constitute farmers selling in the lean season.

Cost of Transportation

As shown in Table 3, the cost of transporting a "batch of yam" ranged from GH₵ 17.00 to GH₵ 45.00 with an average cost of transportation of GH₵27.46 and a standard deviation of 6.94. It is worthy to note that the cost transportation is a function of yam size (table 2 above).

Source of Labour

Hired labour used not to exist however currently the use of hired labour dominates the yam subsector representing 63.9% adoption rate (see Table 4 below) which was inconsistent to the findings of Ojo (2004) studies in Nigeria. Furthermore, the level of adoption of family labour among the sample farmers was 36.1%. The shift in attention from the use of family labour to hired labour might probably be due to the rural urban drift and the quest for education, which makes children and other family members unavailable for farm work.

Trade Potential Factors affecting Hired Labour

The influence of the explanatory variables on the probability of adopting hire labour is shown in Table 5 below. The model contains nine variables, which correctly predicts 76.67% of the variation in adoption probability. From the Wald statistic tests, five trade potential factors were significant (at least at the 10% level).

Producer price

The positive and significant (at $P<0.1$) coefficient (0.004) on producer price implies that a Gh₵1.00 increase in the selling price of yam increases the log odds of hire labour use by 0.004 (which is a 0.1% increase in the likelihood of adopting hire labour). The result conforms to the studies of Stéphanie (2007) on the determinants of environmental innovations in the Swiss and German food and beverage industry. Households who were able to receive high prices because of high demand for their yam tubers were found to be using hire labours on their farm.

Farm Size

Increase in the area under cultivation was found to

Table 4: Distribution of source of labour by adoption levels

Source of Labour	Freq	% (N=510)
Hired	326	63.9
Family	184	36.1

Source: Field survey, 2012

Table 5: Determinants of seed yam Hired labour adoption

VARIABLES	Hire labour		
	Log odds	Odd ratio	Marginal effect
Producer Price	0.004*	1.004*	0.001*
	(0.094)	(0.094)	(0.090)
Addressing Complaints (yes)	0.095	1.100	0.014
	(0.765)	(0.765)	(0.765)
Farm Size	0.061***	1.063***	0.009***
	(0.000)	(0.000)	(0.000)
Time of marketing (during)	-0.005	0.995	-0.001
	(0.194)	(0.194)	(0.191)
Competition	0.142***	1.153***	0.021***
	(0.000)	(0.000)	(0.000)
Outlet of sales (farm gate)	0.007	1.007	0.001
	(0.181)	(0.181)	(0.177)
Outlet of sales (village market)	0.004	1.004	0.001
	(0.359)	(0.359)	(0.358)
Market Integration	0.014*	1.014*	0.002*
	(0.070)	(0.070)	(0.067)
Transportation cost	-0.078***	0.925***	-0.012***
	(0.001)	(0.001)	(0.000)
Constant	-0.780	0.459	
	(0.450)	(0.450)	
Observations	510	510	510
Deg freedom	9	9	
log likelihood	-228.415	-228.415	
Mc Fadden R^2	0.315	0.315	
LR test	210.116***	210.116***	
Classification	76.67%	76.67%	

NB: Stars denote significance at 10% (*****), 5% (******) & 1% (*******) level; p-values for t-test in brackets are shown below the coefficients. *Source: Computed from field survey data 2012*

promote the adoption of hire labour usage. The assertion is obvious from Table 5 above where farm size has a positive and highly significant coefficient of 0.061 corresponding to p=0.000. The implication is that yam

farmers increasing their area under cultivation by one acre increases the likelihood of hiring labours by 0.1%. The result is in agreement with the findings of Assefa and Gezahegn (2004) on the adoption of improved technologies in Ethiopia, using probit and logit models where they reported that farm size had strong and positive effect on the adoption of improved technologies in Ethiopia. The result was unsurprising because during the survey it was observed that producers cultivating on large acres had no option that to go for hire labours since their family source of labour were unavailable and few. The unavailability of the family labour was due to the fact that most of families were schooling. Moreover, families with large labour size could not use their families alone to cultivate their farm because the farms were too big. Hence, producers still have to go in for hire labours. Most of the households perceived their production unit as a business entity and would only prefer to use hire labours for production activities irrespective of the associated cost.

Competition

Results of the study depicted in Table 5 above indicated that competition was significant and positively related to adoption of hired labour at 1% significance level. An increase in the number of competitors by a household increases the log odds of hire labour by 0.142 (which is a 2.5% increase in the likelihood of the use of hire labour by producers). The finding was consistent with the study report of Tang (2006) and Raymond (2007) where they observed that competition among producers or firms generally increases the likelihood of innovation adoption.

Integration into the Market Economy

From Table 5 above it was found that the market integration exerts a positive impact on farmers' likelihood to use hire labours at 10% significant level. Thus, a percentage increase in the sales of yam increases the likelihood of adoption of hire labour by 0.2%. The result of the study agrees with the reports of Hall and Khan (2003); Stefan (2003) and Boehlje and Erickson (2007). It can be juxtaposed that household that sell most of their produce have high motivation and income level to hire the services of labours in their farm. Therefore is obvious that degree of integration into market economy has positive relationship with hire labour use.

Cost of Transportation

The negative sign of the coefficient for the cost of transportation of yam from the farm to the urban markets indicates that households that pay high transport fares tend not to hire labours often in their farms. This variable was significant at 1% level in the regression model.

Reporting directly from the Table 5 above it was observed that, a Gh₵1.00 spent on output transportation decreases the probability of hire labour use by 1.2 percent. The rationale behind this relation is quiet understandable because households spending much on transportation (because of bigger size of tubers) have less to save to effectively employ and pay for the services of hire labours.

CONCLUSION AND RECOMMENDATION

In spite of the high cost of hired labor in the environment of trade liberalization and its related policies in the yam subsector, farmers in Kpandai district invested mainly on hired labour (63.9%) to augment the available family labour for increased yam production. Furthermore, findings of the study reveal that the trade potential factors that were important in explaining the likelihood hired labour use include producer price, farm size, competition among households, market integration, and cost of transportation. The use of hired labour relative to family labour promote efficiency in production and increase in output so it is recommended that a deliberate policy should be developed in order to improve the income levels of these labours to ensure the effective maintenance and continuity of the labours. Furthermore, policies should be developed to incorporate labour saving technologies such as draught power for tillage and/or transportation in order also to reduce the cost of production.

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