PCM002

FACTORS AFFECTING THE DEMAND FOR LABOUR AMONG YAM FARMERS IN EKITI STATE, NIGERIA

Author: A.T. Adesiyan and O. F. Adesiyan,
Department of Agricultural Economics,
Obafemi Awolowo University, Ile-Ife.
adewumiadesiyan@yahoo.com, atades@oauife.edu.ng

Abstract

Labour is the most important input in Nigerian's agricultural production. However, in recent years, as rural labour becomes scarce and expensive, and prices of inputs increase, the price of yam has increased making it a luxury food rather than a staple food for most poor people. The management of available resources in such a way as to improve productivity is therefore inevitable.

This study therefore determined the factors influencing the demand for labour among yam farmers in Ekiti State with a view to explaining the substitutability and or complementarity between labour and other inputs required in yam production. Data was collected from 180 respondents and using a multistage sampling technique and was analysed using descriptive statistics and translog cost function.

Results showed that land, seedyam, capital, labour, output, and the cooperating inputs were significant factor affecting the demand for labour at $P \leq 0.05$ level. The demand for labour was influenced negatively by its own price and price of seedyam, and positively by the price of land, price of capital and yam output.

Labour is a substitute to land and capital but complement to seedyam. Capital is a substitute to land and labour but complement to seedyam. Seedyam is a substitute to land but complement to capital and labour. Land is a substitute to capital, seedyam and labour in the study area.

It was concluded that that farmers can use more of capital and land inputs in order to enhance yam production when the labour is scarce as is the situation among the sampled farmers.

Keywords: *demand, labour, land, seedyam, capital, Yam, elasticity, price*

INTRODUCTION

Yam belongs to the genus "*Dioscorea*" and family "*Dioscoreaceae*". The common edible species in the tropics are white yam (*Dioscorearotundata*) yellow yam (*D. cayenensis*), water yam (*D. alata*), trifoliate yam (*D. dumentorum*), arial yam (*D. bulbifera*) and Chinese yam (*D. esculenta*). Yam is one of the major staple food in Nigeria and has potential for livestock feed and industrial starch production (Ayanwuyi *et. al.*, 2011). Yam is part of the religious heritage of several tribes in Nigeria and often plays a key role in religious ceremony (Sanusi and Salimonu, 2006).

Ekpo *et. al.*, (2000) reported that yam tuber contain pharmacologically active substances such as diosgerine, saponin and sapogenin. Also, yam tuber is a good source of energy mainly from their carbohydrate contents since it is low in fat and protein. Also, it has been reported that yam is a good source of industrial starch whose quality varies with species.

Nigeria is the world largest producer of yam (*Dioscorea spp.*) (Uguru, 1996; Offei, *et. al.*, 2006). Nigeria's share of yam production is over 65% of the total world annual production estimated at 38 million metric tonnes (FAOSTAT, 2014). In Nigeria, Ekiti State is well known for yam production in which it produces about 35% of total yam production (Adebayo, 1993). Yam production in Nigeria has more than tripled over the past 45 years from 6.7 million tonnes in 1961 to 39.3 million tonnes in 2006 (FAO, 2007) but the increase in output experienced over time is actually attributable more to the increase in the area of land cultivated than increase in productivity (Madukwe *et al*., 2000, Nwosu and Okoli, 2010). Furthermore, the production of yam in Nigeria has not been able to meet the demand of the people and earn the expected foreign exchange for the country (Okwuokenye and Onemolease, 2011).

In Nigeria, yam production depends largely on labour intensive traditional techniques (Bamire and Amujoyegbe, 2005 and Oluwatusin, 2011). However, as rural labour becomes scarce and expensive, and prices of inputs increase, the price of yam has increased making it food for the rich rather than staple food for most poor people (Njoku, 2008; Ugwumba, 2011).

There is therefore need to investigate the factors affecting the demand for labour and its responsiveness to changes in output and other inputs in the study area. Hence this study determined the factors affecting the demand for labour in yam production in the study area.

RESEARCH METHODOLOGY

A multistage sampling technique was used to select a total of 180 respondents for the study. The Study area was divided into three zones following the three existing Agricultural Development Program (ADP) zones in the State. In the first stage, two Local Government Areas (LGAs) were purposively selected from each zone based on predominance of yam production within the zone. In the second stage, 3 villages were randomly selected from each of the LGAs and in the third stage, 10 yam farmers were selected at random.

Primary data were collected from the sampled farmers using structured questionnaire. Data were collected on farmers' socio economic characteristics (such as gender, age, years of experience, educational status), inputs (land, fertilizer, herbicides and other capital items), labour, output, input and output prices.

Empirical Model

The cost share equation was used to determine the demand for labour in yam production. The translog form of the cost model was specified and cost share equation was derived from it. Thereafter, the parameters estimates were used to estimate the Allen Elasticity of Substitution related to input demand and the price elasticity of demand for each of the input. The elasticity estimates represent the structure of the production system for the yam farms in the study area. The symmetry and homogeneity properties of the cost function was also examined to ensure the equality of the cross partial derivatives.

RESULTS AND DISCUSSION

4.1 Description of input use, output and cost share by respondents.

Table 1 showed the input use pattern per hectare by the sampled yam farmers in the study area. The table revealed that an average yam farmer spent 1661.80 naira on land, used 2772.60 kilograms of seedyam, used 398 man-days of labour and spent 86,489.00 naira on capital for yam output of 8624.5 kilograms. Table 1 also revealed that labour input had the largest cost share of inputs of 0.45 (45%) while land had the least cost share of inputs of 0.004 (0.4%).

Table 1: Description of output and factor costs shares

Factor	Quantity per hectare	Cost per hectare	Cost Share
Labour (Man-day)	398 (77.16)	189,421.00 (90925.32)	0.45324
Capital (Naira)	86,489.00 (42071.85)	86,488.78 (42071.85)	0.206947
Land (Naira)	1661.80 (974.65)	1,661.80 (974.65)	0.003976
Seedyam (kg)	2,772.60 (1272.00)	140,354.86 (66381.52)	0.335836
Total		417926.44	
Output (Kg)	8624.5 (3420.12)		

Source: Field survey, 2019.
Figures in parenthesis are standard deviations

4.2Determination of the factors affecting the demand for labour in Yam production in Ekiti State.

Table 2 shows that seedyam, capital, labour, output and the cooperating factors (land and labour, seedyam and capital, seedyam and labour, capital and labour, labour and output and land and output) were all significant factors affecting the costs of production. One percent increase in land, seedyam, capital and labour brought about increase of 1.1%, 3.8%, 1.8% and 0.7% in total costs of production respectively. Also, increasing output by one percent brought about 0.4% decrease in the total cost of production. The cost of production can also be reduced by 0.010%, 0.011%, 0.011%, and 0.004% by increasing the interactions between land and labour, seedyam and capital, seedyam and labour and capital and labour by 1 percent respectively, but increasing the interaction between labour and yam output by 1 percent brought about increasing the cost of production by 0.003%.

Table 2: Estimated coefficients of the Translog cost function

Factors	Parameter Estimates	T-values
Constant (B_0)	-79.211	-15.230
Lnland (B_L)	1.078*	2.348
Lnseedyam (B_{SY})	3.777*	11.616
Lncapital (B_C)	1.755*	6.762
Lnlabour (B_{LB})	0.733*	11.331
Lnoutput (B_Y)	-0.356*	-2.037
Lnland2 (B_{LL})	-0.007	-0.232
Lnlandlnseedyam (B_{LS})	0.009	0.798
Lnlandlncapital (B_{LC})	-0.005	-0.820
Lnlandlnlabour (B_{LLb})	-0.010*	-3.523
Lnlandlnoutput (B_{LY})	-0.003	-0.468
lnseedyam2 (B_{SS})	-0.023	-1.822
LnseedyamlncapitaI (B_{SC})	-0.011*	-3.100
LnseedyamlnlabouI (B_{SLb})	-0.011*	-4.885
LnseedyamlnoutpuI (B_{SY})	0.000	0.068
lncapital2 (B_{CC})	0.003	0.746
LncapitallnlabouI (B_{CLb})	-0.004*	-3.553
LncapitallnoutpuI (B_{CY})	0.001	0.317
lnlabour2 (B_{LbLb})	0.005*	5.436
LnlabourlnoutpuI (B_{LbY})	0.003*	2.129
lnoutput2 (B_{YY})	0.002	0.457
Adjusted R square		0.974

Source: Field survey, (2019). * represents 5% significance level

Elasticity of substitution of the input demand

Table 3 shows all the estimated values of elasticity of substitution of input demanded. The elasticity of substitution of seedyam-capital (-1.129) and that of seedyam-labour (-0.608) indicates that seedyam can be substituted for capital and it can also be substituted for labour. It further shows that as seedyam increases, capital as well as labour decreases on the same isoquant. Although seedyam and capital on one hand, and seedyam and labour on the other hand are substitutes, it does not mean that they can function in order to increase output if they do not perform similar technical functions in the production process. It only suggested that the cheaper input will be used in the production process.

The elasticity of substitution of land and seedyam is positive and greater than one (that is 4.036), this implies that seedyam and land are complementary and relatively elastic to each other.

The elasticity of substitution of land and capital, land and labour, and capital and labour are less than one (that is, 0.925, 0.886, and 0.974 respectively). This implies that they are relatively inelastic to each other and they are all complementary inputs. It is suggested that farmers in this study area should make use of the all the combinations of inputs to produce a given level of output.

The elasticity of substitution of seedyam and output, capital and output and labour and output took the value of one which indicate that their elasticity of substitution is unitary, that is, a relative change in the technical substitution gives rise to an equal change in the factor input ratio. This implies that the sampled farmers combined seedyam, capital, labour at an optimal level to produce a given level of output.

Table 3: Allen elasticity of substitution of the input demand

Elasticity	Parameter	Estimate	Elasticity	Parameter	Estimate
σ_{LL}	lnLand*lnland	-4.312	σ_{LY}	lnland*lnoutput	0.999
σ_{SS}	lnSeedyam*lnseedyam	-164.339	σ_{SC}	lnseedyam*lncapital	-1.129
σ_{CC}	lncapital*lncapital	-1.916	σ_{SLb}	lnseedyam*lnlabour	-0.608
σ_{LbLb}	lnlabour*lnlabour	-1.198	σ_{SY}	lnseedyam*lnoutput	1.00
σ_{YY}	lnoutput*lnoutput	0.999	σ_{CLb}	lncapital*lnlabour	0.974
σ_{LS}	lnland*lnseedyam	4.036	σ_{CY}	lncapital*lnoutput	1.00
σ_{LC}	lnland*lncapital	0.925	σ_{LbY}	lnlabour*lnoutput	1.00
σ_{LLb}	lnLand*lnlabour	0.886			

Source: Field survey, 2019

4.4 The Price elasticity of input demand

The parameters of input demand shares have little economic meaning of their own (Binswanger, 1974). However, they are used to determine the variable elasticities of substitution and the factor demand of the inputs. The price elasticities are functions of the input share parameter estimates and the input share variables themselves. The price elasticities of input demand for yam production are shown in Table 4. The parameter estimates of own price elasticities of the inputs- land, seedyam, capital and labour are negative. The negative values of own price elasticity for the estimated variables are consistent with economic theory of demand (Luz et al., 2009), that is, the law of demand which states that the higher the price of a commodity (this case an input), the lower the quantity demanded of that commodity. This also shows that they are all normal inputs to the sampled farmers. Increasing the price of either land, seedyam, capital or labour used for yam production by 1% while keeping others constant leads to a reduction of about 0.84, 2.89, 0.65 and 0.54 percent in the quantity of land, seedyam, capital and labour demanded respectively. This result implies that with input market liberalization farmers are quite responsive to seedyam price changes unlike land, capital and labour price changes.

The cross price elasticity of demand for land with respect to seedyam, capital and labour are all positive. This implies that these inputs are substitutes to land, since an increase in the price of land, brought a decrease in quantity of land and increases in the demand for these inputs, probably because of the relatively abundance of land available to the sampled farmers and the scarcity of labour, seedyam and capital in the study area. A percentage increase in the price of land leads to an increase of about 0.061, 0.341 and 0.399 percent increase in the quantity of seedyam, capital and labour respectively.

The cross price elasticity of demand for seedyam with respect to capital and labour are negative while it is positive with respect to land. These show that while capital and labour are complements to seedyam, land is a substitute, since an increase in the price of seedyam leads to a decrease in the quantity of seedyam demanded and a decrease in the quantity of capital and labour demanded but an increase in the quantity of land demanded. The substitutability of land to seedyam may be because of the relative abundance of land compared to other inputs. Farmers will want to compensate for the reduction in the quantity of seedyam (as a result of price increase) by increasing their yam spacing and therefore increasing the quantity of land demanded A percentage increase in the price of seedyam leads to 0.384 and 0.274 percent decrease in the quantity of capital and labour demanded respectively but 0.787 percent increase in the quantity of land demanded.

The cross price elasticity of demand for capital with respect to land and labour are positive but negative with respect to seedyam indicating that land and labour are substitutes to capital but seedyam is complement to capital. One percent increase in the price of capital leads to about 0.180 and 0.438 percent increase in the quantity of land and labour demanded and 0.017 percent decrease in the quantity of seedyam demanded. The substitutability of land for capital may be a possible because farmers may adopt extensification in order to increase production in case of increase in the price of capital. The substitutability of labour for capital is in agreement with the a priori economic expectation.

Considering the cross price elasticity of demand for labour with respect to land, capital and seedyam, Table 4 shows that the price elasticity for labour with respect to land and capital are positive (indicating that they are substitute) while it is negative with respect to seedyam (indicating that they are complements). One percent increase in the price of labour leads to 0.173 and 0.331 percent increase in the quantity of land and capital demanded respectively and 0.009 percent decrease in the quantity of seedyam demanded. This agrees with the *a priori* expectation for price elasticity of demand for labour with respect to capital and seedyam, but disagrees with the *a priori* expectation for land probably because farmers can increase yam spacing in order to compensate for scarce labour (as a result of labour price increase) since land is relatively abundant.

Table 4: Estimated price elasticities of input demand

Exogenous Variable	Demand for			
	Land	Seedyam	Capital	Labour
Land price	-0.8409	0.061	0.314	0.399
Seedyam price	0.787	-2.498	-0.384	-0.274
Capital price	0.180	-0.017	-0.651	0.438
Labour price	0.173	-0.009	0.331	-0.539
Yam output Level	0.195	0.015	0.339	0.45

Source: Field survey, 2019

CONCLUSION

Yam output can be increased in the study are by increasing the hypothesized inputs of land, labour, capital and seed yam since there are increasing returns to each of the inputs. All the inputs are normal inputs to the farmers and that they can be substituted for each other in case of input price shock. The demand for labour was influenced negatively by its own price and price of seedyam, and positively by the price of land, price of capital and yam output. The demand for capital is negatively influenced by its own price and price of seedyam but positively influenced by price of land, price of labour and yam output. Similarly, the demand for seedyam was negatively influenced by its own price, price of capital and price of labour but positively affected by price of land and yam output. Finally the demand for land was negatively influenced by its own price and positively affected by price of capital, price of seedyam, price of labour and yam output. Labour is a substitute to land and capital but complement to seedyam. Capital is a substitute to land and labour but complement to seedyam. Seedyam is a substitute to land but complement to capital and labour. Land is a substitute to capital, seedyam and labour.

It is recommended that farmers can use more of capital and land inputs in order to enhance yam production when the labour is scarce as is the situation among the sampled farmers.

REFERENCES

Adebayo, W. (1993). Weather and Climate in Ebisemiju, F.S. (ed) Ado-Ekiti Region;. *A Geographical Analysis and Master Plan, Lagos, Alpha prints.* , 11-14.

Agbaje, G. O., Ogunsimi, L. O., Oluokun, J. A., & Akinlosotu, T. A. (2005). Survey of yam production system and the impact of government policies in south-western Nigeria. *Journal of Food and Agriculture & Environment,* , 222-229.

Allen, R. G. (1938). *Mathematical Analysis for Economics.* London: Macmillian.

Ayanwuyi, E., Akinboye, A. O., Oyetoro, J. O. . (2011). Yam Production in Orire Local Government Area of Oyo State, Nigeria. *Farmers Perceived Constraints. World Journal Young Res.* , 1(2), 16.

Babaleye, T. (2003). West Africa Improving Yam Production Technology. *ANB-BIA supplement* , 463.

Bamire, A.S., Amujoyegbe, B. J. (2005). Economic Analysis of Land Improvement Techniques in small-holder Yam based Production systems in the agro-ecological zones of South western, Nigeria. *Journal of Human Ecology* , 18(1): 1-12.

Binswanger, H. P. (1974a). "A Cost Function Approach to the Measurement of Elasticities of Factor Demand and Elasticities of Substitution". *American Journal of Agricultural Economics , 56, No. 2*, 377-386.

(CBN), C. B. (2002). *Statistical Bulletin* , 9 (20), 114-117.

CGIAR. (1997). Priorities and Strategies for Resource Allocation.www.cgiar.org. *Consultative Group on International Research* .

Ekiti State Diary. (2010). Ado-Ekiti, Nigeria: Government Publication.

Ekpo. E. E., Idiong I. C. and Chinemeren O. (2000). The Role of Financial Institutions in Financing Small Scale Agricultural Production in Benue State, Nigeria. *Journal of Agribusiness and Rural Development , 1 (1)*, 12-30.

FAOSTAT. (2014). *FAOSTAT Database (online)*. Retrieved August 10, 2014, from http://faostat.fao.org/.

FAO. (2007). Food and Agricultural Organisation Database. *FAOSTAT website;http://faostat.fao* .

Idachaba, F. (2004). Food Security in Nigeria: Challenges Under Democratic Dispensation. *9th ARMTI Annual Lecture, Ilorin* .

IITA. (1998). *Annual Report 1997.* Ibadan: International Institute for Tropical Agriculture.

Izekor, O. B. and Olumese, M. I. (2010). Determinants of Yam Production and Profitability in Edo State, Nigeria. *African Journal of General Agriculture* , 6(4), 205-221.

Luz M, Malabayabas M, Yorobe J.M and De Castro. (2009). Household Demand Analysis For Fresh Meat in the Phillippines. *Philippine Jornal Of Veternary And Animal Sciences 35(2)* , 168-176.

Luz, M., Malabayabas, M., Yorobe, J. M., De Castro, N. L. (2009). Household Demand Analysis For Fresh Meat in the Phillippines. *Phillippines Journal of Veternary And Animal Science* , 35(2): 168-176.

Migap, J. P., & Audu, F. (2012). Empirical Study on Yam Cultivation and Economic Development of Taraba State: Case Study of Wukari Local Government Area. *Journal of Business and Organisational Development* , 4 (6), 32-53.

National Population Commission (NPC). (2006). *Population Figures.* Abuja, Nigeria: NPC.

Njoku, P. C. (2008). Nigeria Agriculture and the Challenge of the 20th Century. *J. Tropical Agric. Food, Environ. , 1(1)*, 42-53.