



Original article

Economics of potatoes production in katsina metropolis, katsina state, Nigeria

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ARTICLE INFO

ABSTRACT

Article history:

Received 25 September 2012

Accepted 25 October 2012

Available online 30 October 2012

Keywords:

Economics

Potatoes

Production

Katsina metropolis

Katsina state

Nigeria

This research was conducted in Katsina metropolis on the economics of potatoes production. Fifty respondents were randomly selected from five areas namely Rafukka, Kofar Sauri, Kofar Marusa, Kofar Durbi and Gidan Ambassador. Fifty structured questionnaires were randomly administered and the data generated were carefully analyzed using simple descriptive statistics (frequencies and percentages), farm budgeting, gross margin and cob-Douglass production function. Result obtained showed that potatoes production is profitable in the study area with a gross margin of # 1,159,020 and net farm income of #1,057,115. The result obtained from cob-Douglass production function indicates that land, labor, fertilizer, seed and chemicals were found to have positive relationship but not significant with the level of output. The marginal analysis revealed that resources are inefficiently utilized. Land and fertilizer are over utilized while labor, seed and chemicals are underutilized.

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1. Introduction

Agriculture is defined as: the art and science of growing plants and the raising of animals for food, other human needs, or economic gain. This definition describes agriculture as both an art and a science (needs skill and founded on scientifically verified facts) and thus includes specialized disciplines; the words “growing” and “raising” are descriptive of enterprise, activity or practice. It has two main divisions: plant or crop production and animal or livestock production; and its ultimate purpose are for food production, other human needs, or for economic gain. The agricultural sector has continued to make modest contributions to the provision of food and livelihoods to the majority of Nigerians despite the overarching influence of the oil sector on overall national income generation. Therefore, the contribution of agriculture to the gross domestic product, food supply and economy cannot be under estimated.

The potato is a starchy, tuberous crop from the perennial *Solanum tuberosum* of the Solanaceae family (also known as the nightshades). The word may refer to the plant itself as well as the edible tuber. In the region of the Andes, there are some other closely related cultivated potato species. Potatoes were introduced outside the Andes region four centuries ago, and have become an integral part of much of the world's cuisine. It is the world's fourth-largest food crop, following rice, wheat and maize (FAO, 2009). Wild potato species occur throughout the Americas, from the United States to southern Chile (Hijmans and Spooner 2009) The potato was originally believed to have been domesticated independently in multiple locations, but later genetic testing of the wide variety of cultivars and wild species proved a single origin for potatoes in the area of present-day southern Peru and extreme northwestern Bolivia (from a species in the *Solanum brevicaulle* complex), where they were domesticated 7,000–10,000 years ago. (Spooner et al., 2005) Following centuries of selective breeding, there are now over a thousand different types of potatoes. Of these subspecies, a variety that at one point grew in the Chiloe Archipelago (the potato's south-central Chilean sub-center of origin) left its germplasm on over 99% of the cultivated potatoes worldwide. The annual diet of an average global citizen in the first decade of the 21st century included about 33 kg (73 lb) of potato (FAO, 2009). However, the local importance of potato is extremely variable and rapidly changing. It remains an essential crop in Europe (especially eastern and central Europe), where per capita production is still the highest in the world, but the most rapid expansion over the past few decades has occurred in southern and eastern Asia. China is now the world's largest potato-producing country, and nearly a third of the world's potatoes are harvested in China and India (Hijmans, 2001).

2. Materials and methods

An open-ended structured questionnaire was used to generate the survey data from the respondents. Several research questions were asked by the researchers. The questions were:

- a. What are the socio-economic characteristics of the respondents?
- b. Is potato production profitable in the study area?
- c. How are resources been utilized in the study area?
- d. What are the basic problems associated with production?
- e. What are the possible solutions to those problems?

2.1. Study area

The study was conducted in Katsina metropolis, Katsina state of Nigeria. The area is located in the northwestern part of Nigeria; it has a population of 318,132 people (census, 2006). The people of the area are mostly farmers. They are also involved in trade and government work. Crops grown mostly in the areas are cotton millet, groundnut, sorghum, maize, potatoes and cowpea. The species of livestock reared in the area include cattle, sheep, goat and poultry

Katsina is a city (formerly a city-state), and a Local Government Area in northern Nigeria, and is the capital of Katsina State (Encyclopedia Britannica, 2007). Katsina is located some 160 miles east of the city of Sokoto, and 84 miles northwest of Kano, close to the border with Niger. The city is the centre of an agricultural region producing groundnuts; cotton, hides, millet and guinea corn and also have mills for producing peanut oil and steel. The city is largely Muslim and the population of the city is mainly from the Fulani and Hausa ethnic groups. Katsina LGA has an area of 142 km². It is surrounded by city walls 13 miles (21 km) in length. It has an average rainfall ranging from 600-700mm annually. Generally, climate varies considerably according to months and season. The two climates are: a cool dry season from December to February; a hot dry season from March to May; a warm wet season from June to September; a less marked season after rains during the months of October to November, characterized by

decreasing rainfall and a gradual lowering of temperature. The minimum and maximum temperatures of Katsina metropolis are 21° and 35° respectively (www.sunmap.eu, 2011). Modern day Katsina has many information technology companies, providing internet access to the people of Katsina.

2.2. Sampling techniques and sampling size

A simple random sampling was used to select five areas (Rafukka, Kofar Sauri, Kofar Marusa, Kofar Durbi and Gidan Ambassador) from the study area. Ten farmers were selected from each area making a total of fifty respondents.

2.3. Statistical analysis

The data generated from this study were summarized and analyzed using simple descriptive statistics (frequencies and percentages), farm budgeting and regression analysis. Gross margin analysis was employed to determine the profitability of beef marketing in the study area. The gross margin was represented by equation:

$$GM = GI - TVC$$

Where:

G.M = Gross margin

G.I = Gross Sales/Income

TVC = Total variable cost

The net farm income is thus given as:

$$NFI = GM - TFC$$

Where:

NFI = Net Farm Income

G.M = Gross Margin

TFC = Total Fixed Cost

The regression model is represented as:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6$$

Where:

$$\log Y = \log B_0 + B_1 \log X_1 + B_2 \log X_2 + B_3 \log X_3 + B_4 \log X_4 + B_5 \log X_5 + B_6 \log X_6 + e^u$$

Y = dependent variable (quantity of output) kg

X₁ = size of land (ha)

X₂ = hired labor (man day)

X₃ = family labor (man day)

X₄ = fertilizer (kg)

X₅ = seeds (kg)

X₆ = chemical (liters)

B₀, B₁, B₂, B₃, B₄, B₅ and B₆ = Regression co-efficient

U = Disturbance term

3. Results and discussion

Table 1 revealed that 74% of the respondents fall within the age range of 31-50. This is considered to be the active labor force as reported by KTARDA, 1998.66% of the respondents were married and 34% were single. This agreed with the findings of Garba *et al.*, 2012, that married people are indeed involved in farming activities because they have family to take care of. On the level of education, 64% of the respondents have both western and Islamic education, while only 18% had Islamic education only. This implied that majority of the respondents are literates. On the type of occupation of the respondents, 34% of them were engaged in both farming and civil service, while 18% were engaged in farming only. This implied farming and civil service constitute the major occupation of the respondents.

Table 2 showed that 38% of the respondents acquired their land through inheritance, while 46% acquired theirs through rent. On the size of farm, 70% of respondents had lands that were between 0.5-1.0 hectares. On cultivation method, 90% of the respondents used manual method and only 10% used mechanized system of farming. This is due to the fact that farmers still depend on the traditional tools in farming. 62% of the respondents

had their capital from personal savings while 32% from sales of output. This is as result of inaccessibility of the respondents to acquire loan from banks and lending agencies.

Table 1
Biodata of the respondents.

Parameter	Frequency	Percentage
Age		
20-30	10	20
31-40	21	42
41-50	16	32
51 and above	3	6
Total	50	100
Marital status		
Married	33	66
Single	17	34
Total	50	100
Education		
Qur'anic	18	36
Qur'anic and Western	32	64
Total	50	100
Occupation		
Farming only	9	18
Farming and civil service	17	34
Farming and trading	16	3
Farming and rearing	8	16
Total	50	100

Source: Field Survey, 2006

Table 2
Land acquisition, land size, method of cultivation and source of capital.

Parameter	Frequency	Percentage
Land acquisition method		
Purchase	3	6
Inheritance	19	38
Rent	23	46
Gift	3	10
Total	50	100
Farm size (ha)		
0.5-1.0	35	70
1.1-1.5	5	10
1.6-2.0	6	12
2.1-2.5	1	2
2.6 and above	3	6
Total	50	100
Method of cultivation		
Manual labor	45	90
Mechanized labor	5	10
Total	50	100
Source of capital		
Sales of output	16	32
Personal savings	31	62
Government	3	6
Total	50	100

Source: field survey, 2006

Table 3 revealed that 44% of the respondents used hired labor, while 42% used both hired and family labor. Alimi, 2000 found that hired labor is used especially at farm work peak periods and it is characterized by rising wages. 66% of the respondents used fertilizer that ranges between 10-100kg. This indicates that majority of the farmers used small quantity of fertilizer. On the quantity of seeds used 78% of the respondents used seeds that ranges between 10-100kg.

Table 4 revealed that the total cost incurred in potatoes production stood at 1,355,035. The gross income of the respondents was #2,412,150. This was obtained by multiplying the total physical product per unit price of the output.

Table 3

Type of labor used, quantity of fertilizer used and quantity of seed used.

Parameter	Frequency	Percentage
Source of capital		
Hired labor	22	44
Family labor	7	14
Family and hired	21	42
Total	50	100
Quantity of fertilizer(kg) used		
10-100	33	66
101-200	10	20
201-300	6	12
300 and above	1	2
Total	50	100
Quantity of seed(kg) used		
10-100	39	78
101-200	9	18
201-300	2	4
Total	50	100

Source: field survey, 2006

Table 4

Cost of items (variable and fixed cost).

Parameter	Cost(#)
Variable cost	
Seed	195,100
Chemical	101,650
Fertilizer	231,300
Manure	40,250
Labor	684,830
Fixed cost	
Depreciation of implements	101,905
Total	1,355,035

Source: Field Survey 2006

Table 5 revealed that coefficient of multiple determinations (R^2) was 0.418. This indicates that 41.8% of the variation in the dependent variable (output) was explained by the independent variable in the model. The F ratio was 6.333 and significant at ($p < 0.01$). the regression co-efficient of all the output is positive, implying that increasing any of the variables, holding others constant will increase the output of potato.

Table 6 showed MVP and MFC, it also showed the ratio of MVP/MFC. A value obtained of 1.2428 showed that labor is underutilized; this is due to the fact that farmers have other work doing apart of farming. A value obtained of 0.10363 showed that fertilizer is over utilized. Also seeds and chemicals are underutilized with a value of 2.5454 and 11.8868 respectively.

Table 7 showed that 50% of the respondents lack improved seeds and 52% lack adequate fertilizer. There were multiple responses by the farmers in different problems. On solutions to the problems encountered by the respondents, 56% of the respondents suggested for government intervention in potatoes production, 50% suggested for provision of adequate fertilizer.

Table 5
Regression result for potatoes production.

Variables	Regression coefficient	T-value
Constant term		1.925NS
X ₁ (land)	0.251	1.922NS
X ₂ (labor)	0.278	1.620NS
X ₃ (fertilizer)	0.114	0.810NS
X ₄ (seed)	0.023	0.192NS
X ₅ (chemical)	0.168	0.978NS

Source: Field Survey, 2006

R² = 0.418

F = 6.333***

NS = not significant

*** = significant at 1% level

Table 6
Marginal Value Product (MVP), Marginal Fixed Cost (MFC) and MVP/MFC of the independent variables used in production.

Variable input	MVP(#)	MFC(#)	MVP/MFC
Size of land(ha)	30609.76	36000	0.8503
Labor employed(man days)	497.14	400	1.2428
Quantity of fertilizer(kg)	155.45	1500	0.10363
Quantity of seeds (kg)	407.27	160	2.5454
Quantity of chemicals (ltr.)	9509.43	800	11.8868

Source: Field Survey, 2006.

Table 7
Problems faced and solutions to the problems.

Parameter	Frequency	Percentage
Problems		
Lack of improved seeds	25	50
inadequate fertilizer	26	52
Inadequate capital	19	38
Lack of storage facilities	7	14
Pest and disease attack	12	24
Lack of extension workers	7	14
Lack of government assistance	14	28
Total	110*	230*
Solutions		
Government intervention	28	56
Provision of improved seeds	19	38
Provision of fertilizer	25	50
Provision of credit facilities	14	28
Provision of insecticides and pesticides	7	14
Provision storage facilities	16	32
Modern implements	5	10
Total	114*	228*

Source :field survey,2006

*Multiple Responses

4. Conclusion

The study showed that potatoes production is profitable in the study area and it was observed that some resources were underutilized. Some problems were also identified in the study area, such problems were inadequate fertilizer, inadequate capital, lack of improved seeds and many more. Farmers also suggested on the solution to their problems which include governments' intervention, provision of adequate fertilizer and improved seeds.

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