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PROFITABILITY AND RESOURCE USE EFFICIENCY IN COTTON PRODUCTION IN KURFI LOCAL GOVERNMENT AREA OF KATSINA STATE, NIGERIA

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ABSTRACT

A survey on cotton production was carried out in Kurfi Local Government Area of Katsina State with the view to assess the profitability and resource use efficiency in its production. Information was collected through a structured questionnaire administered to a sample of 50 randomly selected respondents. The data were analyzed using multiple regression and gross margin analysis. It was found that cotton producers obtained average gross margin of ₦ 12,500/ha in the area. Most of the respondents operated on small scale basis. The regression coefficient for land, labour, fertilizer and capital in the Cobb-Douglas model were positive, indicating that 1% increase in each of the independent variables will increase output by 0.42%, 0.18 %, 0.26% and 0.21%, respectively. However, with the exception of fertilizer, cotton growers were inefficient in the utilization of all the inputs. There was under utilization of land and over utilization of labour and capital. It was also observed that cotton farmers suffered from low extension services, poor marketing system and credit facilities. Thus, improving the performance of the enterprise requires the need to ensure and sustain judicious use of inputs through well organized extension packages specific to cotton growers.

Keywords: Cotton production; Resource use efficiency

INTRODUCTION

Cotton is the world's most important non-food agricultural commodity which has the best fibre used for texture purpose (Munro, 1987; Anon., 1996). The seeds are source of vegetable oil, while the cottonseed cake provides high quality protein in animal feeds (Idem, 1999; Onu *et al*., 2000). Its production is greater than that of any other fibre crop known to mankind (Anon., 1996).

Cotton crop had served as a foreign exchange earner and the largest labour employer next to public sector in the 1960s (Yayock and Kumer, 1988; Idem, 1999). Sadly, cotton production in Nigeria has declined dramatically with the advent of petroleum oil by 1970. The trauma on the country's economy led to high importation of cotton lint to supplement domestic supply to local industries (Chikwendu, 1993; Idem, 1999). CBN (2000) figures

show no any significant increase in cotton production as output fairly rose from 301 Metric Tones in 1996 to 353 in 2000 Metric Tones. Based on this current trend, the prospect of the country to restore its relative position among world cotton-producing countries cannot be ascertained. This is because cotton production in Nigeria is mainly done on smallholdings, where the crop competes poorly with food crops. The production is not only labour intensive since most of the field operations are usually carried out using manual labour, but also access to high technology inputs such as fertilizers and agro-chemicals is limited by inadequate funds (Onu *et al.*, 2000; Onu and Okunmadewa, 2001). Hence, there is the need to promote cotton production through proper utilization of the little available resources opened to farmers. This can be achieved through evaluation of resource use in cotton production for optimal utilization as well as assessing the current profitability of the enterprise. Unfortunately, much of the available literatures on cotton production in Nigeria have been in the fields of agronomy (Chikwendu, 1993; Idem, 1999). The few empirical studies that had examined the economics of cotton production in Nigeria have hardly any impact on the profitability and resource use efficiency of the enterprise since the country's production remains very low. Thus, many of the resources employed by cotton farmers ranging from land to seed, chemicals, labour and fertilizers could inappropriately be allocated without proper evaluation. Therefore, this study provides baseline information on the profitability and resource use efficiency of various farm inputs used in cotton production in Kurfi Local Government Area of Katsina State.

MATERIALS AND METHODS

Study Area

Kurfi Local Government Area of Katsina State lies within the northern part of State. The climatic condition of the area is that of tropical continental. It experiences cool dry harmattan during the dry season and warm wet condition during the rainy season. The mean annual rainfall and temperature are about 750mm and 34°C, respectively. Soil is sandy in nature and of low to medium fertility. The vegetation belongs to savanna type, a condition suitable for cotton production (Udo, 1993).

Data Collection

A random sample of 50 respondents was drawn from six villages and the Local Government Headquarter. They were purposely selected based on the concentration of cotton farmers in these areas. The selected villages were Birchi, Rawayau, Wurma, Tsauri, Daram, Kaguwa and Kurfi town. Based on proportion of cotton producers in these areas, five respondents from each village and 20 respondents from the Local Government Headquarter (Kurfi town) were randomly selected from an established sampling frame of 100 cotton producers. This gives a total sample size of 50 respondents. Data collected contained information on inputs used in cotton production. The data were analyzed using farm budgeting and multiple regression analysis.

Data Analysis

The profitability of the cotton enterprise in the area was evaluated using gross margin analysis. This is because in subsistence agriculture, the proportion of fixed costs component is negligible (Olukosi and Insitor, 1999). The gross margin is specified as;

GM = GI – TVC Equation 1

Where:

GM = Gross margin
GI = Gross farm income
TVC = Total Variable Cost

Of all the regression models specified, Cobb-Douglass model gave the best fit and was therefore presented and discussed. The model was specified as:

$Y = a.\ x1\ b1.\ x2\ b2.\ x3\ b3\ x4b4$ Equation 2

The logarithmic transformation of the model is given as follows;

$\ln (Y) = \ln a + b1 \ln x1 + b2 \ln x2 + b3 \ln x3 + e$ Equation 3

Where:

Y = Total output of cotton produced by the respondent (kg)
X1 = Land under cultivation (ha).
X2 = Total human labour (man-hours).
X3 = Quantity of fertilizer applied in (kg/ha).
X4 = Durable capital used.
a = Constant term estimated.
b1- bn = Regression coefficients estimated.
e = random error term for the regression model.

Capital inputs considered were hoes, cutlasses and bags. Since these assets last longer than one year, their annual depreciation values were computed using straight-line method.

A resource is said to be efficiently utilized when the ratio of MVP and MFC is equal to one. A ratio greater than one indicates under utilization of input. A ratio less than one shows over utilization of the resource, and profit will be increased by decreasing the quantity of the input (Olukosi and Erhabor, 2005).

Marginal productivities are defined as the changes in the total value product as a result of a unit change in the variable input. The marginal value product (MVP) is calculated using the relation:

MVP =MPP x Py

Where:

MVP = Marginal value product,
MPP = Elasticity of production,
Py = Unit price of the output

RESULTS AND DISCUSSION

Gross Margin Analysis in Cotton Production

Table 1 presents the average gross margin of farmers in the study area with the view to determining the profitability of the enterprise. Information in Table 1 shows that majority of the farmers were small scale farmers. Only 14% of the respondents had gross margin above ₦30, 000. Average gross margin was ₦ 12,500. This shows that most of the producers operate on small scale basis, perhaps, due to their small land holdings. Hence, their income was low and commensurate with their scale of production. This supports the opinion of Falasu (1996) who believes that majority of Nigerian farmers operate at small-scale level. The finding further corroborates the findings of Onu and Adebayo (2000) and Baba and Mabai (2001) who independently reported that cotton farmers realized little profit because of the small size of their farm land.

Table 1: Distribution of respondents according to gross margin obtained in cotton production

Gross margin ₦/ ha	Frequency	Proportion (%)
5,000	0	0
5,001-10,000	13	26
10,001-20,000	22	44
20,001-30,000	8	16
Above 3,000	7	14
Total	50	100

Influence of Resources Used in Cotton Production

Among the production functional forms specified to determine the response of cotton output to resources used, Cobb-Douglas model was chosen as the lead equation. The model was chosen because of its high R^2 value, number of parameter estimates that were statistically significant with correct apriori expectation. Cotton output was considered to be the dependent variable (Y), while land (X1), labour (X2), fertilizers (X3), and capital (X4) were regarded as the independent variables.

Table 2: Estimated Cobb-Douglas Production Function

Variable	Estimated coefficient	T-value	R^2 -value
Constant term	4.3340	3.6488	0.620
Land under cultivation (X1)	0.4230	0.2734**	
Labour (Man-hours) X2	0.1763	1.2553*	
Fertilizer X3	0.2614	1.5671*	
Capital X4	0.2105	0.2823ns	

F- Value = 20.47*; * Significant at 10 %; **Significant at 5%; ns = Not significant

The positive signs of all the estimated coefficients depict that increasing the amounts of land, labour, fertilizer and capitals by 1%, holding other variables constant will increase output by 0.42%, 0.18%, 0.26% and 0.21%, respectively. However, the amount of capital used was found to have insignificant influence in cotton production. The R^2-value of the model showed that 62% of the variation of the cotton output had been explained by the

variables included in the model. The remaining proportion (38%) can therefore be attributed to the random errors and other uncertainties not captured in the model. The joint influence of the independent variables, as measured by the F- value was significant at 10%. This result tallies with the finding of Onu *et al.* (2000), who similarly obtained positive values of land, labour and fertilizer at 5% level of significance using stochastic frontier production model. Thus, the variables could be regarded as the most relevant factors in cotton production. The insignificant contribution of capital could be attributed to the little amount of capital investment nature of most small scale producers. Most of these capital items are fixed assets in nature and the proportion of fixed cost is negligible in subsistence farming (Olukosi and Insitor, 1999).

Resource Use Efficiency

Table 3 shows the respective acquisition cost and marginal value product for land, labour, fertilizer and capital.

Table 3: Marginal value product (MVP) and marginal factor cost (MFC)

Variable	Unit	MVP (N)	Acquisition cost: MFC (N)	MVP/MFC Ratio
Land cultivated (X1)	Hectare	1250.01	695	1.799
Labour (X2)	Man-hour	11.50	465.7	0.025
Fertilizer (X3)	kg/ha	46.5	44.51	1.044
Capital (X4)	N	57.35	234.43	0.24

Field survey

Marginal analysis of input utilization (Table 3) revealed that cotton farmers were not efficient in the use of land, labour and capital. However, they were efficient only in the utilization of fertilizer. Marginal factor costs of most inputs, with the exception of fertilizer input were found to be greater than MVPs for all the resources utilized. The MVP/MFC ratio for the farm land was found to be greater than one, indicating under utilization of the resource. Thus, decreasing the use of land will increase farm profit. There was over utilization of labour and capital due to their low MVP/MFC ratios that were less than one. The inefficient utilization of these scare resources in cotton production could be attributed to inadequate researches and extension services on resource use efficiency in cotton production. A similar finding by Amaza (2000) and Onu *et al*. (2000) also reported inefficiency of resource use in both cotton and food crop production. This wide variation in farmer's specific efficiency levels is a common phenomenon in developing countries (Onu and Adebayo, 2000).

Major Problems in Cotton Production

The major problem of cotton farmers was lack of loans and extension services, which constituted 42%. High cost of fertilizers and the influence of pests and diseases were also observed (Table 4). Problems identified by the respondents were mostly the general problems facing the agricultural sector in Nigeria. Access and affordability of fertilizer input at favourable price have become a political issue not only in the study area but also in most States in Nigeria. Cotton farmers in the study area obtained this commodity with great effort. Thus, they are cautious in its utilization.

Table 4: Problems encountered in cotton production by the respondents

Type of problem	Frequency	Proportion (%)
Lack of loans and extension services	21	42
Pest and diseases	13	26
High cost and lack of fertilizer	16	32
Total	50	100

Field survey

Inadequate extension service was also reported to limit successful cotton production. This corroborates the finding of Yazidi (1989), who argued that cotton production lacks the needed adequate extension services required for maximum production.

CONCLUSION

Cotton production was profitable in Kurfi Local Government Area of Katsina State, but the farmers were inefficient in the utilization of most inputs. There was under utilization of farm land and over utilization of labour and capital. The enterprise would be more profitable through more rational utilization of these resources. Moreover, successful cotton production is constrained by inefficient extension service, lack of loan and credit facilities. With global increase in cotton demand, there is the need to ensure and sustain judicious use of inputs in all cotton producing areas. The State ADPs should also come up with good extension package specifically for cotton farmers.

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