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Analysis of Cost and Return in Cowpea Production : A Case Study Guyuk Local Government Area of Adamawa State, Nigeria

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Abstract:

This study was designed to carry out a profitability analysis of the cowpea production in Guyuk Local Government Area of Adamawa state. The data were collected through the administration of 100 questionnaires using purposive and simple random sampling technique. Descriptive statistics and budgetary technique analysis were the analytical tools used. The result shows that most of the cowpea producer 86 % were aged between 20-49 years, while about 85 % of cowpea farmers had between 5-15 years of experience in cowpea production. Most of the farmers 80 % had one form of formal education or the other with males dominating the business. The computed gross margin and net farm income were (₦54,765.22) and (₦52,414.32) respectively for cowpea production, which indicate that cowpea production is profitable in the area. Major problem identified were, pests and diseases, variability in rainfall, lack of storage facility, and shortage/high cost of inputs. Recommendations were directed toward research development of pesticides to prevent and control pest and disease, access to subsidized farm input and making credit facilities accessible and affordable.

Keywords: Cowpea, profitability, budgetary technique

1. Introduction

Cowpea (*Vigna unguiculata*) is a food and animal feed crop grown in the semi-arid tropics covering Africa, Asia, Europe, United States and South and Central America. It is originated and was domesticated in Southern Africa and was later moved to East and West Africa and Asia. The grains contain 25% protein, and several vitamins and minerals (IITA, 2010). The plant is drought tolerate, well performs in a wide variety of soils, and replenishes low fertility soils being a legume, when the roots are left to decay. Cowpea's high protein content, its adaptable to different types of soil and can be intercropped, its resistance to drought, and its ability to improve soil fertility and prevent erosion makes it an important economic crop in many developing regions. The sale of the stems and leaves as animal feed during the dry season also provides a vital income for farmers (IITA, 2010).

More than 5.4 million tons of dried cowpeas are produced worldwide, with Africa producing the highest nearly 5.2 million and Nigeria is the largest producer and consumer, accounts for 61% of production in Africa and 58% worldwide. In Nigeria, cowpea is mainly cultivated in the northern part of the country where it forms an important part of the farming systems (IITA, 2010). The growth of cowpea production depends on the need to improvement either in through area expansion or productivity. The increase in cowpea production in Nigeria is mainly contributed by expansion of area. The productivity growth may be achieved through either technological progress or efficiency improvement (Coelli, 1995). Several studies indicated that the existing low levels of technical efficiency hinder efforts to achieve progress in production (Belete et al., 1991; Seyoum et al., 1997). Despite the significant growth in cowpea production, there is huge inefficiency in the production, hence the study examine the cost and return accrued to cowpea production.

2. The Study Area

The study was conducted in Guyuk Local Government Area (LGA) of Adamawa state. The local government area is located between latitude 9° 30' and 10° 00' East and longitude 11° 30' and 12° 00' North and has othic luvisols soil (Ray, 1999). It has an average temperature of 26.1° C in December to January and 33 °C in April to May (Adebayo, 1999). The area also has an average rainfall of 700 – 800 mm per annum (Adebayo and Tukur, 1999). It shares common boundaries with, Shelleng Local Government Area to the East, Numan Local Government Area to the South and Lamurde Local Government Area to the South-West. Guyuk LGA also shares common boundaries with Gombe and Borno States to the West and North (Adamawa State Government Dairy, 1999).

The Local Government Area consists of 10 wards namely:, Bobini, Chikila, Banjiram Guyuk, Kola, Dukul, Bodeno, Purokayo Lokoro and Dumna. It has an estimated land area of 871.9 km² with an estimated population of 177,785 people out of which 90,

422 are males while 87,363 are females based on 2006 census (CBN, 2007). Farming is the major occupation of the people of the area with cowpea as the most cultivated crop. Other crops cultivated in the area included maize, rice, millet, sweet potatoes, cassava, cowpea and cotton which is the major cash crop cultivated.

2.1. Sources of data and Sampling Procedure

Data for the study were derived from primary source. The data were collected with the use of a structured questionnaire. Purposive and simple random sampling technique was adopted at various stages as the selection procedures in the selection of 100 respondents comprising thus: Stage I: 50 % of the 10 wards were purposively selected (that is 5 wards selected). Stage II: 35 % of the villages in each of the 5 wards were selected using systematic random sampling to come out with 10 villages. Stage III: 10 % of the total respondents were selected from each village using random sampling to get a total of 100 cowpea farmers and administered questionnaire.

2.2. Analytical techniques

The analytical tools used include descriptive and inferential statistics. The descriptive statistics used include mean, frequency distribution and percentages these were used in the analysis of socio-economic characteristics of the respondents. The inferential statistics used include the budgetary technique analysis

2.3. Gross Margin Analysis

The gross margin was used to estimate respondents' cost and returns in cowpea production in the study area. The gross margin per hectare is the difference between total revenue per hectare (Adebayo, 2005). Gross margin is expressed as:

$$GM = \sum P_i Q_i - \sum K_j X_j \dots\dots\dots(3.4)$$

Where GM = Farm gross margin (₦/ha),

P_i = Unit price of output (kg/₦) Q_i = Quantity of output (Kg/ha) K_j = Unit cost of variable input j (₦/ha) X_j = Quantity of variable input j (kg/ha), $P_i Q_i$ = Total cost associated with variable input j Σ = Summation sign

2.4. Farm Gross Ratio

This is a measure of profitability ratio that gives over all success of the farm. The lower the ratio the higher the return per naira. Olukosi; et al (1988).

The ratio is computed as given below:

$$GR = \frac{TFE}{GI}$$

Where GR = Gross ratio, TFE = Total Farm expense, GI = Gross farm Income.

2.5. Operating Ratio

Operating ratio is directly related to the farm variable input used. Olukosi et al (2008) stated that a ratio of one reveal break even. The lower the ratio, the greater the profitability of the farm business. The ratio is computed thus;

$$OR = \frac{TOC}{GI}$$

Where OR = Operating

TOC = Total Operating cost

GI = Gross Income

2.6. Returns on Capital Investment

$$RI = \frac{GM}{TVC}$$

Where RI = Returns on capital invested

GM = Gross margin

TVC = Total variable cost

3. Results and Discussion

	Variable	cowpea farming	
		Frequency	Percentage
Age	20 – 29	12	12
	30 -39	35	35
	40 -4 9	39	39
	> 49	14	14
	Total	100	100
Gender	Male	79	79
	Female	21	21
Marital status	Married	85	85
	Single	7	7
	Divorced	2	2
	Widower	6	6
	Total	100	100
Level of education	No formal education	20	20
	Primary education	26	26
	Secondary education	31	31
	Tertiary education	23	23
	Total	100	100
Family Size	< 5	33	33
	6 – 10	47	47
	11 – 15	13	13
	>15	7	7
	Total	100	100
Farming experience	< 5	15	15
	6 – 10	31	31
	11 – 15	14	14
	>15	40	40
	Total	100	100
Farm size	≤ 1.0	37	37
	1.1 – 2.0	47	47
	2.1 – 3.0	7	7
	3.1 – 4.0	5	5
	4.1 – 5.0	2	2
	> 5.0	2	2
	Total	100	100
Land acquisition method	Inheritance	21	21
	Gift	56	56
	Purchased	3	3
	Leased/hired	21	21
	Total	100	100
Occupation	Farming	61	61
	Others	39	39
	Total	100	100
Access to credit	Yes	3	3
	No	97	97
	Total	100	100
Extension visit	Yes	6	6
	No	94	94
	Total	100	100

Table 1: Distribution based on Socio-Economic Characteristics of Respondents

Table 1 revealed that most of cowpea producers are young, with majority 86 % of the respondents were within age bracket of 20 – 49 years in cowpea production. Only 26 % of cowpea farmers were more than 50 years of age while no farmer was below the age of 20 under cowpea production. It could be asserted that at age of less than 20 years, an individual is yet to commence cowpeas production as an occupation. The high percentage of farmers within 20 - 49 years might be due to the fact that, within the age bracket, people are still in their active age and are capable of undergoing the vigorous labour involved in cowpea cultivation. This finding is in agreement with Adeoti (2001) who reported that the average age of farmers in Kwara state was between 20- 49 this is when the farmers are active and still very productive.

As shown in Table 1, 79 % of the farmers are male while 21% are female who practice cowpea production. The dominance of the male in the cowpea production activities may be due to the fact that it involves more fatigue and stress, and the low percentage of women participating in the cowpea farming may also be explained by socio-cultural factors affecting women and not as a result of technical and managerial inefficiency. Furthermore, male farmers are the most beneficiaries of subsidized fertilizer sales in the study area. This conforms to the assertion by Phillis and Umebali (2008) that agricultural policies do not explicitly recognized the role of women farmers. Consequently, development assistance is usually directed to male farmers, regarding women's work on farm as simply "what women do" hence their contribution have remained invisible.

Results in Table 1 shows that 85 % of cowpea producers were married, whereas 7 % single, 2 % widow (ers) and 6 % divorced of the cowpea producers. The high percentage of the respondents are married people recorded in production systems could be due to the fact that they have more family responsibilities such as provision of food, educational/training of children etc. Another reason might be that the dependants also serve as good source of family labour to the married people. This agrees with the observation of Contando (1997) who stated that the bulk of agricultural production come from farm families in the developing economics.

Table 1 revealed that only 20 % of the cowpea producers had no formal education while the rest had one form of formal education or another. This is an indication that majority of the farmers are literate and could be receptive to agricultural innovation. Njoku (1991) observed that years of formal education has a positive influence on adoption of innovation by farmers.

Table 1 also revealed that 33 % of the cowpea farmers have family size of 1 – 5 people, 67 % have family size above 5. This implies that large family size, an indication that some of them may depend on their family for labour. Greater family size increases efficiency because most farmers are financially constrained and thus the availability of family labour will ease hiring of labour (Bayacay and Rola, 2001).

Table 1 show that about 15 % of cowpea producers have a farming experience of 1 – 5 years, while 85 % of cowpea farmers have farming experience more than five years. This implies that majority of the farmers had cowpea experience to improve their production technique to increase their productivity. These farmers are experiences which could positively influence their management capabilities of the crops. As reported by Adeyumi and Okunmadewa (2001) that the economic efficiency of farmers significantly affects their farming experience, experience.

Table 1 reveals 98 % of cowpea farmers had farm size ranging from 0.5 – 5 ha while only 2 % of cowpea farmers had farm size above 5 hectares. The result reveal that majority of the farmers are small-scale farmers. This may be attributed to high level of poverty where poor farmers can only afford small parcel of land for subsistence farming coupled with inadequate credit facilities necessary to expand their farm lands. According to FOS/FBS (1999) and Awoke and Okoji (2004), small scale farmers are farmers who cultivate between 0.1 – 4.99 hectare and produce on subsistence level.

As observed by Adebayo and Onu (1999) that land ownership is one of the socio-economic characteristics of farmers which affect their productivity. Analysis of 1 above shows that 77 % of cowpea farmland was inherited while only 23 % was either leased or purchased. The implication of majority using inherited land is that it would lead to fragmentation of farmland as a result of sharing among siblings hence reducing the size of farmland for agricultural practices.

Results from Table 1 also reveals that 61% of cowpea producers of the respondents took farming as their full time main occupation while 39 % of cowpea farmers engaged in other activities like trading, civil service, carpentry etc and practice farming as part-time basis. This implies that the majority of the respondents depend mainly on farming as their major source of income to cater for themselves and their families. The result reveals that only 3% of the cowpea farmers obtained loan. The remaining 97 % of the cowpea producer did not obtain loan. They complained that both interest rate and transactional cost of agricultural loans were high especially from formal lender. So their main source of capital is personal savings. This implies that most farmers might not be able to take advantage of economies of scale and hence cost inefficient. This finding is in agreement with Stephen (2006) who reported that 96.58 % of farmers in Adamawa state depend on personal saving.

3.1. Extension Visit to the Respondents

Extension is one of the major tools through which new innovations are transferred to the practicing farmers which usually have significant effect on the economic efficiency level of farmers. The study shows that extension visit in the study area was very poor as only 6% of cowpea farmers were visited by extension agents and 94% of sole and mixed cowpea farmers which constitute the majority were not visited. The use of agricultural technologies is believed to be a strategy for making small scale economically viable (Bzugu and Gwary, 2005). So implies that the level of efficiency of cowpea producers might be static since the extension workers were not visiting the farmers.

3.2. Cost and Return in Cowpea Production Systems

The distribution of cost and returns involved in the production of sole and mixed cowpea production systems is presented in Table 2. The result table revealed that, the average total cost of respondents' production per hectare was ₦18234.78 out of which ₦15883.88 were variable costs accounting for 87.10% of the total cost for cowpea production. This was largely attributed to the high cost of labour in the study area and having converted family labour by cost at prevailing market price rate. This finding is

inconsonance with Ohajianya (2003), who reported that labour cost is a major component of the total cost of rice farming. The fixed cost was ₦2350.90 which accounted for 12.90 % of the total cost for cowpea production. The average outputs of the respondents were 485.19 kg per hectare cowpea production systems. Also, the revenue generated was ₦70649.1 per hectare for cowpea production.

The table reveals that cowpea production had gross margin and net farm income of ₦54,765.22 and ₦52,414.32 per hectare. The study therefore revealed that, the business of cultivating cowpea is profitable

3.3. Profitability Analysis of Cowpea Farmers in the Study Area

	Production variable	Value (₦/ha)
A. Variable Cost	Seed	1202.16
	Pesticide	98.72
	Herbicide	907.56
	Fertilizer	1377.58
	Transportation	1172.75
	Storage	25.71
	Labour	11,099.40
	Total variable cost (TVC)	15,883.88
B. Fixed Cost	Rent on land	431.88
	Farm tools	1919.02
	Total Fixed Cost	2350.9
	Total cost of production (A + B)	18,234.78
C. Returns	Average output	485.19 kg
	Average price (₦/kg)	125
	Total revenue	70649.1
	Gross Margin (GM)	54,765.22
	Net farm Income (NFI)	52,414.32
	Gross margin on naira invested	3.01
	Net farm income on naira invested	2.33
	Farm Gross ratio (GR)	0.3
	Operating ratio (OR)	0.26

Table 2: Average cost and returns per hectare of cowpea Production

3.4. Challenges Respondents Experienced in Cowpea Production

The farmers also complained of high cost of input such as fertilizer and herbicides as majority of farmers cannot afford to purchase the right quantity needed to increase cowpea production. This finding corroborates Kwaghe *et al.* (2000) who reported high cost of important farm inputs militating against efficient farming. Some of the identified problems agreed with the findings of Tashikalma *et al.* (2010).

The table also reveals that the major problem facing farmers cultivating cowpea under mixed farming are pest, disease and worms (13.76 %), shortage/high cost of inputs (13.43 %), lack of storage facility (12.58 %), inadequate farm credit (12.25 %) and variability in amount of rainfall (11.74 %). Most of the cowpea grown with is disposed off immediately after harvest to avoid pest infestation coupled with the problem of lack of storage facility.

S/No.	Problem	Freq.*	cowpea	Rank
1	Shortage/high cost of input	80	13.43	2
2	Inadequate farm credit	73	12.25	4
3	<i>Striga</i> infestation	60	10.08	7
4	Shortage of labour	62	10.4	6
5	Variability in amount of rainfall	70	11.74	5
6	Pest and diseases	82	13.76	1
7	Birds invasion	42	7.05	8
8	Low price of cowpea	32	5.37	9
9	Lack of storage facility	75	12.58	3
10	Inadequate extension support	20	3.36	10
	Total	596*	100%	

Table 3: Problems Associated with Cowpea Production

4. Conclusion

Findings from this research revealed that, cowpea production is a profitable venture, despite the series of challenges identified.

5. Recommendations

Producers which consequently constrained increased cowpea production in the study area. To address these bottlenecks and subsequently increase the farmer productivity, the following recommendations are proffered.

- Government Based on the findings of this study, it is obvious that, the various challenges experienced by the cowpea should ensure adequate and timely supply of farm inputs such as fertilizer; herbicide and pesticides at subsidize rates and also, make credit facilities accessible and affordable.
- Farmers should form cooperative societies to ease input procurement and to take advantage of the existence of Fadama programmes in the study area.
- Farmers should be encouraged to use improved seed varieties to reduce Striga infestation.
- Communities should provide accessible roads linking farms, community and the market so as to ease the cost of transportation.
- Policies to improve farmers' education should be intensified by the government and private sector as this would go a long way to aid farmers in production. This is because farmers make better technical decision if they acquire basic education and have greater farming experience.
- There should be a labour saving device/technology to reduce the over dependence of most farmers on manual labour for cowpea production.

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