Pakistan Journal of Social Sciences 4 (6): 778-781, 2007
ISSN: 1683-8831

Resource Use Efficiency in Cassava Processing in Two Selected Areas of Abia State, Nigeria

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Abstract: Cassava processing business is an important enterprise, which provides income and employment to greater proportion of rural population of Nigeria. But the quality of the products from processing is very low. The method employed is very tedious resulting perhaps from inefficient use of techniques and lower management at processors' level. To investigate into the fact, the study was conducted at processors' level in two areas in Abia State with a sample of 72 small-scale processors by applying Cobb Douglas production function model. The functional results showed that some technological inputs such as grater machine and other inputs were over utilized whereas expenditures on some others like presser and miller machines, diesel (fuel), human labour and repairs were under utilized. Results of the study also indicates that the small scale cassava processors although economically more rational in some cases, were not using resources at an optimum level. Despite these few cases, the business resulted in an increasing return to scale, as the sum of production coefficient was more than unity. It was therefore ,suggested that small-scale cassava processors could have to reallocate their resources like grater machine and other inputs by reducing expenditures while increasing more of diesel.

Key word: Resources, efficiency, cassava processing, processors, small scale, Abia State, Nigeria

INTRODUCTION

Cassava is one of the important sources of carbohydrate food in Nigeria. Globally, the country has continued to maintain it lead in cassava production. Development of improved cassava lines in the diverse tropical ecologies is of top research priority in Nigeria and many other national agricultural research systems where the crop is a major staple food, industrial and currently an export commodity in Nigeria (Okeke and Eke-Okoro, 2006). The tubers after peeling are processed into various cassava products as raw material (Starch), cassava mash or gari or fufu production, chips etc. But, the methods used in achieving these are almost tedious which may lead to inefficient use of resources and perhaps low quality and quantity products. Despite the fact that Nigeria ranked first in world production of cassava (FAO, 2005) there has not been any record of export of cassava until recent policy on cassava which has created an enabling environment for expansion of the market. Obviously this fit required more efficient methods of processing.

The current presidential initiatives on cassava have classified cassava as cash crop (Orheruata *et al*., 2005). This implies that for the products from cassava to compete favourably in the international market, we need to go beyond tedious methods of processing which perhaps seems inefficient. The methods used in cassava processing in some parts of Abia State seems tedious and may perhaps lead to inefficient use of technological inputs and low quality products. An efficient processing technique in food could lead to increase in the quality and quantity of food available for consumption (Nelson and Donald, 1980; Ogbonna and Ezedinma, 2005).

The cassava processors capital inputs are grater, presser, fryer, sifter and miller machines and head pan. Apart from miller and grater machines, which are being operated by power engine, the rest are manually operated. Other logistics in this venture include expenditures on diesel (gas), water, repairs and operational levy (i.e. charges from Local government Authority). Some of these machines are relatively expensive and at such require efficient handling. The irrational use may impede the level of profitability on processors level.

Thus, this study attempt to investigate into factors influencing the efficiency of resources use in cassava processing, perhaps to identify limiting factors in the course of achieving returns to cassava processing. The

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general belief is that small scale processing is better and more efficient than medium or large scale cassava processing.

MATERIALS AND METHODS

The required data on this study were collected through survey method during 2005 cassava processing season with semi-designed questionnaire. A sample of 150 cassava processors were purposively selected and interviewed from two areas: Umunneochi and Isuikwuato areas in the Abia North Agricultural zone. These two areas were randomly selected out of four areas, which make up the zone. The zone is known for its abundant food supply in the state. However, out of the 150 cassava processors interviewed, 72 were found to be useful, 31 and 41 from Umunneochi and Isuikwuato areas, respectively.

Analytical model: The Cobb Douglas production function model was applied to analyse the data. The choice of this function was based on its fitness to agricultural production (Barman, 1993; Ezeh, 1998; Barman and Chaudhury, 2000; Barman *et al*., 2002; Onyenweaku and Nwaru, 2005).

The Model is specified in logarithmic form as; $\text{Log } Y = \text{Log } B + a_1 \text{Log } x_1 + \ldots\ldots\ldots\ldots + \text{an Log } Xn$.
The specified implicit form was;

$$Y= f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, e)$$

Where;

- Y = Gross return (₦), X_1 = Grater cost (₦),
- X_2 = Presser cost ₦, X_3 = Miller cost ₦,
- X_4 = Diesel cost ₦;
- X_5 = Human labour cost ₦,
- X_6 = Repairs cost ₦,
- X_7 = Other inputs ₦ (rent, water, head pan and operational levy i.e, money charge by Local government Authority),
- B = Constant and
- e = Error terms. However, basic statistics were also used in reporting the results of the study.

Measurement of variables: Marginal Value Productivity (MVP) for all variable inputs was measured in terms of naira. The estimation of MVP involved taking the inputs (Xi) as well as gross return (Y) at their geometric means (Dhawan and Bansal, 1977; Barman *et al*., 2002) The MVP was computed by multiplying the regression coefficient of the given resource with the ratio of geometric mean of gross return to the geometric mean of the given resource.
This is expressed as follows: $MVP_{(xi)} =$

$$a_1 . Y (GM) / X_i (GM).$$

Where; I = 1, 2.........n and Gm represents the geometric mean. The MVP for all variables inputs was measured in terms of Naira.

Economic efficiency of resources: The economic efficiency of the cassava processors as the users of resources can be measured by comparing MVP of inputs to their marginal costs in acquisition. The cost of a naira was ₦1.36 represented as the cost of acquisition of inputs. Since the variables used in analysis were expressed in terms of value, a 36% rate of interest was charged for the cost of all used inputs for a period of one year only. The ratios of MVP of each input to their respective acquisition cost were calculated. A ratio equal to unity indicates the optimum use of that factor. A ratio greater than unity, implies that using more of that resource could increase the return. But a value of less than unity indicates the unprofitable level of resources, which should be decreased to minimize losses (Barman *et al*., 2002; Mbanasor and Obioha, 2003; Mbanasor and Wogu, 2006).

Problem of multicollinearity: To ascertain the problem, a zero order correlation matrix for all explanatory variables was obtained for this production function. The correlation coefficient between a pair of explanatory variable was treated if it was greater than 0.8 (Heady and Dillon, 1961).

RESULTS AND DISCUSSION

The results on Table 1 shows the operational frequencies of cassava processors in the study areas. Out of 72 small-scale cassava processors, 45.83% of processors carried out operation for two consecutive periods per week. This implies that a greater proportion of customer's patronizes these classes of processors. The 31.90, 15.27 and 7% represents those that operate for one, three and four periods per week, respectively.

The regression analysis was performed with the specified functional model. The production coefficients and estimated values of different parameters in the model is shown in Table 2 and discussed, for the sample small scale cassava processing investment. The level of regression coefficient was found to be different for

Table 1: Operational frequency of small scale cassava processors in the studied areas of Abia State

Number of days per week	Frequency	(%)
1	23	31.90
2	33	45.83
3	11	15.27
4	5	7.00
Total	72	100.00

Source: Field survey, 2005

Table 2: Summary of regression results and related statistics of the small-scale cassava processing enterprises

Variable	Regression Coefficient	MVP of factor of Production ₦	Geometric Mean ₦	Ratio of MVP to their costs
Intercept	-2.47174(-0.71)			
Gross return (Y)			590720.00	
Grater (X_1)	-0,0031(-0.03)	-0.14133	15465.28	-0.10
Presser (X_2)	0.14218 (0.72)	4.64097	18097.82	3.41
Miller (X_3)	0.15968 (0.74)	1.91278	49313.75	1.41
Diesel (X_4)	0.08253 (1.65)*	0.71845	67860.00	0.53
Human labour (X_5)	0.92226(12.41) ***	10.62835	51277.78	7.81
Repairs (X_6)	0.20168 (1.94)***	1.67460	71143.05	1.23
Other inputs (X^7)	0.0186 (-0.52)	-1.92954	5694.30	-1.42
Sumof coefficients	1.47			
R^2	0.88			
F - value	(69.80)***			
N	72			

Figures in the parentheses are t-ratios,* = 10% ** = 5% and *** =1% significant levels, respectively

Table 3: Zero order correlation matrix of variables for studied cassava processing in Abia state

Variables	Y	X1	X2	X3	X4	X5	X6	X7
Y	1.00	-0.02	-0.62	-0.73	-0.12	-0.18	-0.47	0.18
X1		1.00	-0.26	-0.16	-0.14	0.06	-0.13	-0.23
X2			1.00	0.15	-0.04	0.10	0.33	-0.22
X3				1.00	0.13	0.20	0.02	-0.14
X4					1.00	-0.39	-0.02	0.16
X5						1.00	0.01	-0.74
X6							1.00	-0.03
X7								1.00

different variables. It is shown from the Table 2 that the coefficients of the factors fuel (Diesel), human labour and repairs (maintenance) were 0.08253, 0.92226 and 0.20168 which were significant at 10, 1 and 5% level, respectively.

This indicated that if fuel, human labour employed and repair were increased in cassava processing business by 1%, there would be an increase in gross return of cassava processing by 0.08253, 0.9226 and 0.20168%. But the coefficients of the expenditures on presser and miller machines was neither significant nor negative, this implies that either the cassava processors were rational in allocating these resources which are necessary factors for break-even in cassava processing business, or the inputs were used most inefficiently. The coefficients of grater and other inputs (hand pan, rent, water and operation levy) however, were non-significant and negative. This suggested excessive use of these two items in the cassava processing business, perhaps creating room for inefficiency (Barman *et al*., 2002; Mbanasor and Wogu, 2006). The sum of regression coefficient was 1.47. This was higher than unity, which implied that there was an increasing return to scale in small cassava processing business. The coefficient of multiple determinations (R^2) was 0.88. This implied that the explanatory variables used in the model specification were important. At such 88% of variation in the cassava processing was explained by them. The F-value was observed to be 69.80 and highly significant at 1% level showing a good fit of the model. Precisely, the larger the R^2 value is the more important the regression equation is in characterizing the endogenous variable (Gomez and Gomez, 1984; Barman *et al*., 2002). From Table 2, the MVP of per unit expenditure on human labour was ₦10.63 in cassava processing. The MVPs of expenditures on presser, miller and repairs/maintenance of machine were ₦4.64, ₦1.91 and ₦1.67, respectively. This results shows that there was good scope for increasing return from cassava processing by employing efficiently more presser, miller, human labour and repairs of machine as the ratios of MVP to their acquisition cost were greater than unity. On the other hand, the cassava processors on the study areas must drastically decrease the expenditure on inputs like grater (-₦0.14) and other inputs (-₦1.93) for cassava processing at current situation. But the expenditure on diesel (₦ 0.72) may be increase for more efficient cassava processing and returns.

It was also found that the inter-correlation between independent variables was low. No correlation coefficient between explanatory variables was more than 0.8. Thus satisfying the criterion for non-serious of multicollinearity (Table 3) (Heady and Dillon, 1961; Barman *et al*., 2002).

CONCLUSION

Studies on the operational frequency of cassava processing has shown that processors who employed 2 periods per week were highest followed by those with 1, 3 and 4 periods per week. Overall functional analysis brought out that the small scale cassava processors were rational in making expenditures on presser and miller machines, diesel (fuel), human labour and repairs of

Machines, as their coefficients were positive but significant except for presser and miller machines that were non-significant. The ratios of MVPs to factor costs of these resources were estimated. The results show that inputs like presser and miller machine, human labour and repairs were efficiently used for raising return from cassava processing. Their ratios were greater than unity. Less than unity ratios of MVPs to factor costs as shown by grater machine and other inputs indicated that their expenditures were greater than their contribution at such were not used at an optimum level except for diesel that was under utilized. Therefore, it is suggested that small-scale cassava processors could have to reallocate their resources by reducing the cost on grater machine and other inputs if they are to break even in the business. More specifically the inputs like human labour, repairs of machines, presser and miller machines that shows greater efficiency in their usage should be maintain to ensure increasing income from the cassava processing business.

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