# PROFITABILITY ANALYSIS OF SHEA BUTTER IN NORTHERN REGION OF GHANA

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## ABSTRACT
  *This research analysed the profitability of processors and marketers of shea butter in Northern region of Ghana. The analysis used primary data from 120 respondents who were selected purposively. With the aid of regression, gain cost and investment return analysis, the aim of assessing profit influential factors, general profit and individual profits of respondents was achieved. The results through the application of the appropriate models indicate that, input price for nut, cost of transportation and storage cost were significant, but inversely related to net gain while quantity process, household size, education level and experience level were significant positive factors associated with net gain. In general, shea butter enterprise was find to be recursive for investment, but the amount of capital employed by participants were local and hand process technology leading to low productivity. Based on the findings, the research recommends that development partners should give support to participants who happens to be women. This will improve production and hence improve the living standard of the rural poor.*

**KEYWORDS:**  *Benefit, Cost, Enterprise, Processors, Production*

## INTRODUCTION
  Ghana is picked to be comparative advantage country in the production of shea nut which has early maturing trees and better quality of the seed (nuts) relative to her West African neighbours (NARP, 1993). Greater benefits can be drive from the comparative advantage if exploited and critical studies or research could be conducted to reveal how increasing efficiency or adoption of improved technology could increase net revenue from shea butter processing. Furthermore, shea butter processing and trading are major income generating activities that offer employment to rural women particularly. Development policy in Northern region of Ghana entail the use of shea butter extraction as significant factor in poverty alleviation and food security. The nut role has also attracted the attention of the government of Ghana in recent times which

has led to the establishment of a division of the Cocoa Research Institute at Bole in the Northern Region to research into the development of cultivable species of the shea nut tree and other valuable spices beneficial to the people (Aboyella, 2002). As observed to be valuable and economically derived commodity, any measure taken to increase total output of shea butter production will ultimately raise the income of shea butter producers in particular, and the living standards of shea butter consumers, and thus contribute to an increase in national income – all people in the shea butter value chain shall benefit (Issahaku, et al., 2011).

In the developing world, most of the studies on shea butter dwelled on examining efficiency, especially technical efficiency, giving limited empirical work to the profit analysis. Not undermining the significant of technical efficiency and improvement in allocative efficiency which can lead to greater production efficiency. This research intends to find out the benefits participants earned by engaging in shea butter processing and marketing.

## OBJECTIVES OF THE STUDY

❖ To determine the factors that affect the profit level of processors and marketers of shea butter in Northern region of Ghana

❖ To examine the gross profit level of the sample processors and

❖ To assess each individual processor or marketer gain in the shea industry

## METHODOLOGY
## REGRESSION ANALYSIS

Estimation of the relationship between vital socio-economic variables and the net revenue of shea butter processors and/ sellers was analysis with the guide of regression. Regression is an econometric approach employed for predicting the value of dependent variable given the values of the independents variables. The method also measures the degree of association between two or more variables; hence, the coefficient of determination ($R^2$) shows the degree of fluctuation of the dependent variable (Y), which is explained by changes in the independent variables (X(s)). The model for this analysis is given below as follow:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots$$
$$\dots + \beta_n X_n + \varepsilon_{ij} \dots (1)$$

Where $\beta_0$ is the constant term or intercept and $\beta_1$, $\beta_2 \dots \beta_n$ represent the parameters to be estimated and **ε** is the error term.

## ENTERPRISE BUDGETARY ANALYSIS

Knowing the net profit of the processors/marketers of shea butter called for the adoption of enterprise budgetary analysis to estimate cost and return in shea butter processing and marketing. According to Farayola, et al., (2012) and Adegeye and Dittoh (1985), profit is defined as the net flow of income. This implies, measurement of profit largely depends on what parameters chosen to be used; in essence, profit indicates whether a business is worthwhile or not.

Benefit Cost Ratio and Rate of Return on Investment were used to measure the profitability and determine the worth-wholeness of shea butter processors businesses.

Profit = Total Revenue – Total Cost
Mathematically,
$$\pi = TR - (TFC + TVC) \dots (2)$$
Where:

$\pi$ denote Profit; TR is Total Revenue (amount derived by selling units of product from the enterprise); TFC is Total Fixed Cost (spending on fixed assets used in processing and marketing e.g. calabash, cooking pot) and TVC is the Total Variable Cost (cost incurred processing and marketing shea butter e. g. cost of raw materials, transportation cost). The Gross Margin (GM) equation is given as:

$$GM = TR - TVC = P \times Q - TVC, \dots (3)$$
where:

GM = Gross Margin (in Ghana Cedi), Q = Quantity of shea butter processed (in kg), P = Price of processed shea butter (in Ghana Cedi).

## BENEFIT COST RATIO (BCR)

Another critical measure of profitability that was employed was BCR. The reason behind this was to elevate and confirm the profitability of each respondent of shea butter processors and marketers. The formula is stated as:

BCR = Total Revenue (Benefit) ÷ Total Cost.

As asserted by Issahaku et al, (2011) and Adegeye and Dittoh, (1985), for or before a business can be termed profitable venture, the investment criteria require that BCR should be greater than one {BCR > 1}.

## RATE OF RETURN ON INVESTMENT

Rate of return on investment is another measure used to determine the worthwhileness of a business. Rate of Return = (TR –TC) / TC; by interpretation, the rate of return has a direct relation with net gain – the higher the rate of return of an investment, the more profitable the business is.

## SAMPLE DESIGN AND GEOGRAPHICAL AREA

The study covers selected districts in Northern region of Ghana because of the level of processing and marketing of shea butter in the region. Northern Region occupies an area of about 70,383 square kilometres, is the largest region in Ghana in terms of land area. Northern region is edged by Upper East and Upper West Regions to the north, Brong Ahafo and Volta Regions to the south, and two neighbouring countries, the Republic of Togo to the east, and La Cote d' Ivo ire to the west. The soils types are savannah Ochrosols, which develops under rainfall average between 800 mm and 1500 mm. There are predominantly medium sandy loams in the upland and valley respectively. This supports the germination of both natural and artificial shea tree through which shea nut is drive and processed in to shea butter.

Data was collected from selected persons who engaged in the processing and selling of shea butter from various towns and villages within Northern region of Ghana. Variables of consideration were the socio-economics characteristics of respondents, the cost and revenue connected to the production and marketing of shea butter and the challenges encounter in the shea butter industry. Data was collected from 120 shea butter processors and marketer using a semi-structured questionnaire from 8 different communities – namely Gesunaayili, Mbanaayili, Vitting, Yong, Savelugu, Sankpagla, Kaanfiehihyili, and Kpilo, all located in Northern Region of Ghana. Varied numbers were given to the different community depending on the number of shea butter processor as some communities have few and others the numbers were great. But in all, all the 120 questionnaires were completely answered enabling the researcher to do analysis.

## RESULTS AND DISCUSSION DETERMINE FACTORS OF PROFIT

The regression analysis result for determine factors of profit for shea butter processors and marketers is presented in Table 1 as shows below. The estimated coefficients of quantity processed, household size of respondents and years of education are positively and significant at 1%. The experience of respondents in the butter enterprise was also positively related to profit, but significant at 90% confident interval. While cost of storage and input cost of butter (nut price) was inversely related and significant at 99% confident level, cost of transportation was negatively linked but was significant at 5% significant level. The results imply, an increase in the units of production, household size of respondents, experience of the workers in the industry and years of education will affect the profit of the enterprise positively. On the other hand, for profit to increase, the proprietor should reduce the cost of production through a decrease in the price of transportation cost, price of shea nut and cost of storage. The higher the quantity processed, the larger the net revenue obtained; then, the more the years' processor/producers spend in business, the more the net revenue. All the variables results signs are in conformity with the a-priori expectation.

The coefficient for the adjusted R square of 0.8024 implies that the independent variables (regressors) explained 80.24% of the total variation in the dependent variable (regressand) which is the net revenue, while the remaining 19.76% is attributed to other factors not included in the model thus, error term. The F-value was found to be significant at 1%; this implies that all the explanatory variables taking together have significant effect on the net revenue. Therefore, there is no need of accepting the null hypothesis of the F-test.

## Table-1 Results of double logarithmic model for shea butter

| Variables | Coefficients (Elasticity) | Standard Error | t-statistic | Probability | A Priori Expectation |
|---|---|---|---|---|---|
| Cons | 4.0365 | 0.0521 | 1.34 | 0.048** | |
| Lnage | 0.7482 | 0.0628 | 1.09 | 0.462 | +/- |
| Lnbutter qty | 0.3894 | 0.0204 | 2.18 | 0.003*** | + |
| Lnmarital status | 1.4942 | 0.0394 | 1.19 | 0.193 | +/- |
| Lntransportation | -0.2396 | 0.3484 | -1.17 | 0.041** | - |
| LnHHsize | 0.5388 | 0.0551 | 2.08 | 0.000*** | + |
| Lneducaton | 0.6346 | 0.7848 | 1.29 | 0.0045*** | +/- |
| Lnexperience | 0.9345 | 0.6474 | 1.02 | 0.0853* | + |
| Lnstore cost | -2.3849 | 0.9573 | -1.04 | 0.0032*** | - |
| Lnnut price | -0.7832 | 0.0284 | -1.28 | 0.0011*** | - |
| Observation | 120 | Jarque-Bera | 1.005474(0.324412) | | |
| Prob > F | 0.0000 | B-G LM: F-stat (1) | 0.131763(0.213823) | | |
| R-squared | 0.8735 | F-stat (2) | 1.283778(0.31464) | | |
| Adj R-squared | 0.8024 | Q-stat (1) | 0.136554(0.07467) | | |
| F-statistic | 63.36 | Q-stat (2) | 1.437723(3.6887374) | | |
| Log Likelihood | 28.22901 | ARCH Test, F-stat | 1.074532(0.152403) | | |
| Sum squared resid. | 0.78803 | Akaike info criterion | -0.1736429 | | |
| S. E. of regression | 0.147495 | Hannan-Quinn criter. | -0.635025 | | |
| Mean VIF | 1.05 | | | | |

*Note: Dependent variable is lnprofit and ***P=0.01;    **P=0.05 ;    *P=0.1*
*Source: Field Survey, 2016*

Table 1 also shows the regression results of diagnostic test for double logarithmic model. The Jarque-Bera test for ascertaining normality in the distribution of the residuals leads to a value below the critical value, this implying that, the residual series has a normal distribution. To ensure effective measure of homoscedasticity, both the Breusch-Godfrey serial correlation LM test and the Q-stat values indicated the absence of first and second order serial correlation in the residuals, with the ARCH test confirming a homoscedastic nature of the residual series. The Variance Inflation Factor (VIF) mean value of 1.05 is less than 10 implying that there is no statistical significant multicollinearity among the regressors.

The constant term had a coefficient of 4.0365 which is significant at the 5% level. This implies that, when all the variables/parameters are maintained, net revenue will increase significantly with time considering everything to be the same. The positive behaviour of the constant term by implication shows significant dependent or increase in the demand for shea butter in the market. Hence therefore, there is the need for government and external support to take advantage of the increasing demand for shea product, especially, natural shea butter.

## COST AND RETURN ANALYSIS

Shea butter processors and marketers` profitability was analysed using cost and return analysis. The total cost of each respondent was computed and Total revenue was also estimated to determine the profitability of the processed shea butter to firm. From the result of the analysis, the annual total cost for the 120 respondents of shea butter processors and marketers was calculated. Total variable cost was easy to drived as it comprised the summation of all cost that changes with respect to production whiles to fixed cost was estimated using straight-line depreciation method. The total revenue for each enterprise was estimated to be unit price of shea butter by quantity sold in the year. Based on the figures of total cost and total revenue for the sample size, profit was calculated as:

$\pi$ = TR – (TFC +TVC)

= TR – TC

= (12,965,670 – 9,573,340) = GH₵ 3,392,330

GM = TR – TVC

= (12,965,670 – 8,653,980) = GH₵ 4,311,690

## INVESTMENT ANALYSIS

Ascertaining the profit level of each respondents was very critical this called for investment analysis. The benefit cost ratio analysis and rate of return to Ghana cedi analysis were computed as illustrated in Table 2 below. The results in Table 4 indicates that 67.5% of the 120 respondents (processors and marketers of shea butter) operate above the breakeven point (>1) – the cost of their production and marketing is less than their the revenue from production while only 10.8% operates

below breakeven point (<1), meaning their cost of production and marketing exceed the revenue from production and 21.7% operates at breakeven point, that is, the producers net gain for engaging in shea butter production and marketing is zero. The investment analysis clearly shows that shea butter business in Northern region of Ghana is profitable since majority of the respondents are earning supernormal profit.

**Table-2 Results of Benefit Cost Ratio of Respondents**

| Benefit Cost Ratio | Number of Respondents | Percentage |
|---|---|---|
| Less than 1 | 13 | 10.8 |
| Equal to 1 | 26 | 21.7 |
| Greater than 1 | 81 | 67.5 |
| Total | 120 | 100 |

*Source: Field Survey, 2016*

Table 3 below shows the results of rate of return on investment (RRI) which provides the amount of profit that a respondent earned on every Ghana cedi. The results show that, greater percentage (40%) of the respondents realized an average profit of between GHP10 (GH₵ 0.1) and GHP50 (GH₵ 0.5) inclusive as profit on every GH₵1 invested in processing and marketing of shea butter. Also, 30.8% realizes profit between GHP60 (GH₵ 0.6) and GHP100 (GH₵ 1) on every GH₵ 1 invested, while 13.4% realize profit of more than GH₵ 1 on every GH₵ 1 invested made on shea butter processing. However, only 15.8% run the business at lost. By computation 84.2% of the respondents earned abnormal profit and only 15.8% earned subnormal profit. This results is in conformity to the cost gain analysis which shows that locust shea butter enterprise is an attractive business to investors.

**Table-3 Results for Rate of Return on Investment**

| Return on Investment | Number of Respondents | Percentage |
|---|---|---|
| Less than 0 | 19 | 15.8 |
| 0.1 – 0.5 | 48 | 40.0 |
| 0.6 – 1 | 37 | 30.8 |
| Greater than 1 | 16 | 13.4 |
| Total | 120 | 100 |

*Source: Field Survey, 2016*

## CONCLUSION AND RECOMMENDATION

The result of the research revealed that shea butter processing and marketing enterprise in Northern region of Ghana is a small-scale enterprise which contributes and provided reasonable income and employment to many household members in the study area. For instance, the annual income accruing to the people in the enterprise was positively related to their livelihood as they earned enough profit for their basic needs of food, clothing, shelter and health care. Fundamentally, the profit from the shea butter processing and marketing activities revealed that the people in the business were living far below the poverty line of $ 11,130 per year for one person or $ 14, 218 per year for a couple and $ 17, 374 per year for a family of three (Christian and Larry, 2011) compare with $ 370 per year in 1990's (World Bank, 1990 and Hauser and Pilgram, 1999) as computation of the net gain per person show that, each respondents annual gain from the processing and marketing of shea butter was $ 8,077 equivalent to GH₵28,270 using 2016 conversion rate (GH₵ 3.5=$ 1).

Based on the findings of the study, the research recommends that, though, they are newly discovered method of processing shea butter through the development of modern machine which the respondents did not adopt due the fact that the machines are expensive, there is the need for government to support them by given them group or solidarity loan in the form of hire purchase through which they can acquire the Morden machine and also share their knowledge in the group they will form. Alternatively, Non-governmental organisation can give the processor on kind loan at affordable and subsidized price or interest rate to increase production and eliminate stress associated with the crude method. Cosmetic companies and others that used shea butter as a raw material can improved method of preservation, packaging and marketing for the product to be competitive in the world markets by reducing the odour of the product and beautify the butter through colour addition without losing vital nutrients and/ reducing the quality of the product in order to generate foreign exchange and improve the price given to the processors. Shea tree with its economic value is threatened in its alternate uses as fuel-wood and charcoal; hence this should be guide against with rules and regulations, rather, effort should be directed towards growing more of the tree to increase production of the seeds. The waste and by product of shea butter is also a valuable resource such as generation of electric energy. This should be improved to add value to the main product of shea nut.

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