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FOOD SCIENCE & TECHNOLOGY | RESEARCH ARTICLE

Assessing the profitability of small scale local shea butter processing: Empirical evidence from Kaleo in the Upper West region of Ghana

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Abstract: This paper assesses profitability of small scale local shea butter production in Ghana. The study used cross-sectional data from 110 sampled shea butter processors randomly selected from Kaleo in the Upper West region of Ghana. Profitability methods such as gross margins, net incomes and net returns on investments of production units were employed to evaluate the profitability of shea butter producers. Simple linear regression model was also employed to estimate identified determinants of profitability using gross margin as the dependent variable. The results showed that shea butter making in the study area is profitable with positive average values of gross margins, net incomes and net returns on investments. Access to market information, access to credit, length of production cycle (time), savings, experience and household size were found to be significant determinants of gross margin. It is recommended that existing producer groups/cooperatives

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PUBLIC INTEREST STATEMENT

The shea tree has for several decades played significant role in the livelihood of rural people in Ghana as an important natural resources that could be adequately exploited as a tool for poverty reduction especially in northern Ghana. The seed is the main raw material for producing the fatty extract called shea butter which is a staple component of the local diet in mostly the savannah regions of the country, whilst its kernels serve as an important source of income for women. Aside the usual traditional crop farming, small scale local shea butter production is a vibrant industry that require adequate attention of policy decision making bodies such as ministries of agriculture, finance and economic development, trade and industries and development NGOs. It is important to bring to fore the potential of the local shea butter industry because of its eminent importance to the subsistent farm households especially as an off-farm work which contributes immensely to food security in the sub region.

where members interact to gain understanding of the market trend besides, negotiations on prices and other terms of trade should be strengthened to attract more members, prioritize business-development through routine training and also explore market opportunities both locally and internationally. Furthermore, microcredit and financial institutions should develop low cost lending models in order to provide affordable credit to small scale local shea butter processors in Ghana.

Subjects: Agriculture & Environmental Sciences; Agriculture and Food; Environment & Gender; Environment & Business; Environment & Economics; Environmental Economics

Keywords: profitability; gross margin; shea butter; simple linear regression

1. Introduction

The shea tree (*Vitellaria paradoxa*) commonly grows in the Guinea Savannah and sparsely in the Sudan Savannah areas of Ghana (almost the entire area of Northern Ghana, over about 77,670 square kilometres in Western Dagomba, Southern Mamprusi, Western Gonja, Lawra, Tumu, Wa, and Nanumba with Eastern Gonja having the densest stands) (Ferris, Collinson, Wanda, Jagwe, & Wright, 2001). Additionally, there is also sparse Shea tree cover found in Brong-Ahafo, Ashanti, Eastern and Volta regions in the South of the country. The Shea tree has played significant role in the livelihood of the rural people in Ghana over centuries (Lovett & Haq, 2000); as one of Ghana's economic natural resources that could be exploited and used as a tool for substantial poverty reduction and socio-economic development especially in Northern Ghana. Shea butter is a fatty extract from the seed of the Shea tree. According to Schreckenber (2004), shea butter is a staple component of the local diet, and at the same time its kernels serve as an important source of income for women. The local shea butter industry has over the years contributed substantially to the socio-economic development in most parts of the world especially West and Central Africa and serves as an important household resource in the Savannah regions of Ghana, Cote d'Ivoire, Burkina Faso, Mali, Togo, Benin and Nigeria (Ferris et al., 2001). The local shea business is one of the most vibrant traditional business aside farming in the northern (where it is usually referred to as "women work") part of Ghana and it serves as a source of income to most rural women. Internationally, shea butter has been traded for so many years for use in food (margarine and chocolate) industry and also in the cosmetics industry. They are usually used as a cocoa butter equivalent (CBE) in the chocolate industry where they are mixed with other non-timber forest products (NTFPs) such as palm oil for further production. Shea butter has high concentration of triglyceride giving it rich consistency which is valuable for skin creams, shampoos as well as other cosmetics (Schreckenber, 2004).

Despite the numerous benefits of the small scale shea butter business both locally and internationally, processors who are mostly women are observed to record low revenues which are relatively insufficient to cater for costs of production let alone making profits to take care of their other needs. This an alarming development for the rural economy as there is always a disincentive to invest in an unprofitable venture. Undeniably the small scale local shea butter sector in Ghana has been identified as a tool for poverty alleviation and women empowerment. It is therefore imperative to assess the performance of the sector; hence this paper seeks to assess the profitability of the small scale local shea butter business and identify factors that affect profitability because profitability is the key variable that decides the long-term survival of an enterprise.

1.1. Shea in Ghana

In northern Ghana shea trees dominate the savanna parklands and are intentionally preserved largely on farmlands because of its importance to the subsistence of farm households (Kent & Bakaweri, 2010). The tree is perennial and starts bearing its first fruits between 10–15 years old and attains full production when it is about 20–30 years producing nuts for up to about 200 years. The yields of the Shea tree vary significantly per tree as demonstrated in research (Boffa, Yaméogo, Nikiéma, & Knudson, 1996). The average yield is 15–20 kilograms of fresh fruit per tree, with

optimum yields up to 45 kg. Each kilogram of fruit gives approximately 400 grams of dry seeds. Every part of shea tree is useful, for instance the fruit is eaten, and the leaves serve as fodder and an ingredient for making alkaline and paint (Lovett & Haq, 2000). The kernels of the shea fruit have high concentration of oils and have long been collected and processed by women in savannah communities, where they provide a useful source of fats in diets. They are sun-dried for few days before storing in sacks and if they are properly dried kernels can be stored up to 2 years without going bad. Shea nuts and butter have over the years been an important commodity for trade in West Africa and in Ghana for that matter (Chalfin, 2004; Kent & Bakaweri, 2010). The status of shea nut activities as women's work has raised attention on the potential of shea industries as a promising development activity for semi-arid regions (remote and low agricultural potential) that offers particular benefits to women. Different studies have found shea to be significantly important for the indigenous people of the upper west region in Ghana as household incomes have increase with shea contributing up to about a quarter to half of it. As an important source of fats and vitamins shea has also contributed to the nutritional values of many households in the region (Carette, Malotau, van Leeuwen, & Tolkamp, 2009).

In spite of the great potential of the shea industry in the country especially the northern sector, most young women drift to the southern part in search of perceived better living conditions which affects the demographics of both the north and the south adversely (Yaro, 2013). Government of Ghana and NGOs have over the years implemented projects and programs aimed at improving the living standards of women in the north especially in the areas of agriculture and remunerative commodity development to clamp down on the drift to the south in search for greener pastures. Examples of such projects include the Northern Rural Growth Programme (NRGP) and the Resilient and Sustainable Livelihoods Transformation Projects (RESULT) implemented by the Association of Church-based Development Projects (ACEP) and The Canadian Feed the Children (CFTC). Ghana Cocoa Marketing Board (GCMB) in collaboration with the Cocoa Research Institute of Ghana (CRIG) has established CRIG substation in Bole aimed at helping to develop the shea industry to create a more permanent and sustained income generation venture for women in the three Northern regions, so as to support their domestic needs. Community Life Improvement Programme (CLIP) was also established in 1997 to help boost the shea industry. CLIP renders community level services in food security, water supply and micro-credit, where the micro-credit component of CLIP is expected not only to help increase the patronage of rural women in the shea industry, but also to help intensify and expand the activities of existing entrepreneurs in the shea industry.

1.2. Shea butter processing methods

Butter making is laborious and time consuming (Schreckenber, 2004). Kent and Bakaweri (2010) estimated that time spent to produce one bag of nuts which weighs 90 kg was 72 hours. Two main methods of extraction have been identified which are the traditional/local method and the improved methods. The improved method is further broken down into "improved shea butter processing technology (ISBPT) and the bridge press". With the traditional method the only mechanized stages include milling and/or crushing of nuts (Issahaku, Al-hassan, & Sarpong, 2011). For the improved methods, the first comprises a grinder (crusher), corn mill, and a kneader (ISBPT), that is the Improved Shea Butter Processing Technology. The last one known as the Bridge Press (BP) consists of a crusher, corn mill and a manually operated hydraulic press. These methods are estimated to achieve an extraction rate of 35–50% from boiled nuts and relatively higher rates from raw nuts (Mohammed, Boateng, & Al-hassan, 2013). It is also estimated that using the traditional method enable processors to extract about 60% of all the crude butter, at an extraction rate of about 20–31% (SNV, 2006). This process is widely seen to be less effective because it produces poor quality of butter which results in low profit margins (Mohammed et al., 2013). In Ghana and West Africa at large, the traditional method of production dominates. Several studies on shea butter processing have been conducted in Ghana with particular reference to the northern part of the country. These studies have usually focused on efficiency (allocative, technical and operational) and on profitability (e.g. Agbenu, Kanyi, Seidu, & Tsekumah, 2009; Carette et al., 2009; Issahaku et al., 2011; Mohammed et al., 2013). However, these studies have given limited empirical evidence on the socio-economic factors that

influence the profitability of shea butter processing in the region. This paper therefore sought to assess the profitability of the small scale shea butter processing by examining gross margins, net incomes and net return on investment (NROI) of processors and also estimate socio-economic factors that influence profitability.

2. Methodology

2.1. Study area

The study was conducted in the Nadowli-Kaleo District located in the Upper West region of Ghana. It lies between latitude 10°20' and 11°30' north and longitude 3° 10' and 2°, 10' west and is bordered to the south by Wa Municipal, west by Burkina Faso, north by Jirapa and Lambussie-Karni Districts and to the east by the Daffiama-Bussie-Issa District (Ghana Statistical Service [GSS], 2016). The Nadowli-Kaleo District, with a territorial size of 1,132.02 km² extends from the Billi Bridge (4 km from WA) to the Daputori Bridge (almost 12 km from Jirapa) on the main Wa-Jirapa-Hamile road and it extends from the Black Volta to Daffiama from west to east (GSS, 2016). The population of Nadowli-Kaleo District, according to the 2010 Population and Housing Census, is 61,561 representing about 8.8 percent of the region's total population and it is basically made of rural localities. The mainstay of the district is agriculture accounting for about 85% of the active labour force followed by commerce/services and industry accounting for the remaining 15% (GSS, 2016). The industry sector is characterized by small-scale activities and the use of labour intensive production technology which includes basketry, cloth/smock weaving, blacksmithing, gold mining pito brewing, pottery and shea butter extraction (GSS, 2016).

2.1.1. Data collection and sampling technique

A well-structured questionnaire was used in April 2016 to obtain relevant primary qualitative and quantitative data from shea butter processing women in Kaleo in the Nadowli-Kaleo district of the Upper West region of Ghana. Secondary data were sourced from the GSS, text books, on-line materials and published papers which served as the bases for checking the reliability, conformity and consistency of the results obtained from the study. A multistage sampling technique was used to select shea butter processing women to participate in the survey. Thus, purposive sampling technique was employed to select the Upper West Region from the 10 regions of Ghana and also the Nadowli-Kaleo district in the first and second stages, respectfully, because of the district's relatively high engagement in small-scale activities especially pito (local beer) brewing and shea butter extraction aside agricultural activities which dominates (GSS, 2016). Finally, 110 shea butter processing women were randomly sampled for the study. All participants agreed to participate in the research study by signing informed consent forms.

2.2. Profitability analysis

Basic economic theory states that firms are profit maximizing entities. Keynes (2013) argued that profit is the engine on which business enterprises thrive and that every business entity should earn enough profits to sustain it and grow it through the long run. Profit is the excess revenues over the associated cost of production over a specified period of time. Profitability on the other hand is the ability of an investment to earn returns from its use (Tulsian, 2014). Profitability analysis throws more light on the current operating performance and efficiency of business entities (Tulsian, 2014). It is helpful to make pronouncements with net incomes relating it to other figures such as sales, cost of goods sold, operating expenses and capital invested. Profitability analysis is considered one of the best techniques to measure the productivity of capital employed as well as the operational efficiency of a business. This study employs profitability methods such as gross margin, net income and NROI to assess the profitability of shea butter processors in the Nadowli-Kaleo district of the Upper West region of Ghana.

2.2.1. Gross margin analysis

Gross margin estimate was used to evaluate profitability (see Abu, Abah, & Okpachu, 2011; Somda, Kamuanga, Münstermann, & Bittaye, 2003; Tiamiyu, Adagba, & Shaahu, 2014). Gross margin (GM) is

defined as the difference between total revenue (TR) and total variable costs (TVC). This is specified below as:

$$GM = TR - TVC \quad (1)$$

TR = PQ; P = price per unit of sheabutter sold, Q = quantity of sheabutter sold.

Where; GM = Gross Margin; TR = Total Revenue; TVC = Total Variable Cost. An enterprise is considered profitable when it records positive gross margin, which means that GM is greater than TVC. On the other hand, a negative gross margin value indicates an economic loss to the enterprise.

2.2.2. Net income

This is the difference between gross margin (GM) and total fixed costs (TFC). In other words, it is the difference between total revenue (TR) and total cost (TC) specified below as:

$$NI = GM - TFC \text{ or } TR - TC \quad (2)$$

A positive NI means that an enterprise is profitable and worth undertaking.

2.2.3. Net return on investment

This is the ratio of net income to total cost. Return on investment is a measure used to determine the worthiness of a business and the rate of return has direct relationship with net gain. This means that the higher the rate of return on an investment, the more profitable a business is (see Deng, Dossou, & Tanko, 2017). It is specified as:

$$NROI = \frac{NI}{TC} \quad (3)$$

The estimated ratio indicates the value generated in return for every cedi invested in shea butter processing. A low NROI might be a disincentive to attract investors into a venture.

2.2.4. The cost structure of shea butter making

The total cost of producing shea butter comprises all expenses incurred in turning sheanuts into butter. That is both total variable cost and total fixed cost. Variable costs include labour cost, capital expenditures (all cash payments made for milling, crushing and kneading of sheanuts as service charges for the use of processing machines and transportation costs, costs of fuel wood, cost of dye, market taxes, costs of weighing shea butter and the depreciation of physical capital items such as pots, pans and roasting machines) and cost of raw materials. It is worth noting that the cost of equipment such as kneaders, crushers, mills and pressers are not included since they are not owned by individual producers but by groups and are maintained by revenues obtained through the services rendered to processors. Cost of raw material refers to the amount of money used in purchasing sheanuts for processing into butter. Labour cost is evaluated as the opportunity cost of family labour since family labour is mainly used in shea butter production and it is estimated by multiplying labour man-days of a production unit by the daily wage prevailing in the study area. Fixed costs are the costs of capital items that do not vary in the short run. For the purposes of this study fixed cost items include pans, roasting machines and pots.

2.2.5. Determinants of profitability

Simple Linear regression model was employed to examine the factors that influence profitability as measured by gross margin (GM). In this case the estimated equation takes the form:

$$\pi_i = \beta_i X_i + \varepsilon_i \quad (4)$$

where the dependent variable (π) denotes the estimated gross margin for sampled farms; β_i represents the coefficients to be estimated; X_i is a vector of explanatory variables hypothesized (access to market information, savings, credit access, household size, experience, length of production cycle (time), record keeping, volume of butter produced) to influence gross margin and ε_i represents the error term assumed to have a zero mean and a constant variance.

Table 1. Description of variables, measurements and a priori expectation of variables for the regression model

Variable	Measurement	A priori expectation
Access to market information	1 if butter processor belonged to a cooperative, 0 otherwise	+
Savings	Ghana cedis	+
Credit access	1 = yes, 0 otherwise	+
Household size	Number	+
Experience	Years	+
Time	Days	+/-
Record keeping	1 if a processor keeps record, 0 otherwise	+
Output	Kilograms	+

2.2.6. Hypothesis of explanatory variables

Producers' level of understanding of the market makes it possible for them to negotiate prices and terms of trade with considerable level of bargaining power (Kent & Bakaweri, 2010). Access to marketing information is therefore hypothesized to have a positive effect on profitability and it is incorporated into the model as dummy variable taking the value of 1 if a butter producer belonged to a cooperative/group where they could interact with other producers to inform themselves well about current happenings in the market and 0 otherwise (Table 1). Savings is hypothesized to have a positive effect on profitability because it is seen as the extra income from the butter production which the producers can use for other things especially reinvesting in the shea business. It is measured as the amount of Ghana cedis (GHS) a producer is able to set aside for other purposes (Table 1). Access to credit enters into the model as a dummy variable measured as 1 in the event that a butter producer had a secured source of credit and 0 otherwise. Credit is essential for businesses to acquire inputs in large quantities and also to facilitate processes that require financial resources. Hence access to credit is expected to have a positive effect on profitability. Household size is expected to influence profitability positively. The local shea business relies so much on household members for its labour requirement. Household size is captured in the model as the number of a butter producers' household members. The experience of shea butter processing is hypothesized to have a positive effect on profitability as current production decisions are taken based on past and present experience as well as the experiences of others. This variable is captured as the number of years a shea butter producer has been in the business. Time spent in the production cycle is an important factor in determining profitability of every business. Timely delivery of required volumes and quality shea butter to the market can only be achieved if the production of the butter is done in a considerable period of time. That is the time taken for nut picking, boiling, drying, cracking etc. the length of production cycle is measured as the number of hours/days spent to produce one bowl of shea butter which is estimated to weigh about 4 to 7 kg. The variable record keeping is hypothesized to have a positive effect on shea butter business profitability. It describes business data in the form of written records usually related to production cost, inputs and outputs from which management decisions for daily activities and future plans can be taken. It enters the model as a dummy variable taking the value of 1 if a butter producer keeps records and 0 otherwise. Microsoft excel and STATA version 13 were used to estimate the data obtained for this study.

3. Results and discussion

3.1. Socio-economic characteristics of butter processors

The results of the study as shown in Table 2 indicates that majority of shea butter processors (76.4%) had access to market information. This implies that most of the shea butter processors in the study area belonged to a cooperative society where they have regular meetings to interact among themselves, negotiate with buyers and also to bargain prices to favour their course. Dietz, van der Geest,

Table 2. Descriptive statistics of socio-economic variables

Variable	Description	Number	Percentage (%)
Access to market information	Yes	84	76.4
	No	26	23.6
Credit access	Yes	68	61.8
	No	42	38.2
Record keeping	Yes	60	54.6
	No	50	45.4
	<i>Mean</i>	<i>Minimum</i>	<i>Maximum</i>
Household size	8	3	15
Experience	21.7	11	37
Savings	84.3	50	200
Time	7.3	2	13
Output	397.8	90	1,700

Source: Field data (2016).

and Obeng (2013) found that it is quite easier nowadays for farmers in the Northern region to access non-local markets and also get better prices for their produce. Majority (61.8%) of processors as against 38.2% of the same indicated that they have access to credit from some savings and loans organizations operating in the district capital, Nadowli and also Wa the regional capital. These savings and loan companies advance group loans to processors at relatively low rates compared to the commercial banks. Better access to such credit services has contributed to increase income-generating activities whereby a lot of people have access to loans through microcredit schemes, susu groups; group credit is most popular among women and it has helped them to start up small businesses to generate their own incomes (Dietz et al., 2013). Poor record keeping, and accounting information usually makes it difficult for financial institutions to advance loans/credit to SMEs due to inadequate evidence of their potential risk and returns (Jahur & Quadir, 2012). More than half (54.6%) of the shea butter producers interviewed indicated that they keep records of their production and sales activities. They recounted that NGOs that assisted them considered their record keeping behaviours.

With regards to household size, 8 persons per household on the average was recorded, with a lowest household size of 3 persons and 15 persons maximum. Denkyirah, Okoffo, Adu, and Bosompem (2017) estimated the mean household size to be 7 persons per household and that it indicated large family size in their study area. Experience in shea butter production averaged 21.7 years among respondents and it ranged between 11 and 37 years. Al-hassan (2012) observed an average of 15 years of experience in shea butter processing among women and that such long years of experience was expected to position them to produce quality butter to meet the standards of the market. The level of savings in the study area was relatively low, ranging between Ghc 50 and Ghc 200 per annum. On the average a shea butter producer saved Ghc 84.3 per annum. Elsewhere in KwaZulu-Natal Province, South Africa, a study among smallholder farmers by Kisaka-Lwayo and Obi (2012) also suggests low levels of savings among farmers. The extraction of shea butter takes 7.3 days on the average with a minimum and maximum days of 2 or 13 respectively depending on the volumes of work. However, the processes involved in the extraction do not last the whole day. But some of the processes need to be done on the same day with limited time intervals which makes it quite difficult. For instance, breaking of nuts lasts between 45 min to 1 h; roasting—1 hour 15minutes; pounding—45 min; grinding—1 h to 2 h; beating and boiling between 1 to 2 h (Carette et al., 2009). The volumes of shea butter produced over a season ranges between 90 kg and 1,700 kg with an average of 397.8 kg.

3.2. Gross margin, net income and net return on investment

The results of the profitability analysis in which gross margins, net incomes and NROI were estimated is presented in Table 3. It comprises minimum and maximum values of the parameters, means and standard deviations. The study reveals that on the average shea butter producers in the study area obtain a gross margin of GHS 163.24. The lowest gross margin value recorded for the sampled shea butter producers is GHS 62.00 against a maximum of GHS 390.30. Similarly, producers' average net income is estimated to be GHS 34.64. This is an indication that the shea butter business in the study area is profitable hence worth undertaking. The worst performing shea butter producer in terms of net income makes a loss of GHS 86.00 whereas the best performing producer makes a net income of GHS 270.30. For every GHS 1.00 invested in the butter production in the study area, a producer gets GHS 0.18 in return on the average. The estimated minimum and maximum values of the NROI are a loss of GHS 0.42 and a gain of GHS 1.50 respectively.

3.3. Determinants of profitability

The regression model results for the factors hypothesized to determine gross margin of shea butter production in the study area is also presented in Table 4. The coefficient of all the variables included in the model met the a priori expectation. Access to market information was statistically significant at 10% and positively determines gross margin. In other words, producers who responded as being members of groups where they interact to gain knowledge of the market and negotiate prices of produce increased profits compared to their counterparts who have no such information from groups. Al-hassan (2012) in a related studies recommended that shea producers should strengthen their existing groups and also form cooperatives where they did not exist in order to have a unified voice in the output market. The variable time is negatively linked to gross margin but comes as a significant determinant at 5%. This means that the longer the time spent in producing shea butter, the less profits they obtain because they would also delay in supplying to the market especially at the time buyers are available.

Table 3. Estimates of profitability indicators

Variable	Mean	Std. dev.	Min.	Max.
Gross margin	163.2445	80.24311	62	390.3
Net income	34.64455	78.58793	-86	270.3
Net return on investment	0.1809199	0.3954421	-0.423645	1.50417

Table 4. Estimates of determinants of profitability

Variables	Coefficients	Std. error	t-statistic	p > t
Market info.	28.50868*	15.81135	1.80	0.074
Output	0.0886755	0.0551036	1.61	0.111
Time	-10.11165**	4.502635	-2.25	0.027
Credit access	27.15785**	13.86526	1.96	0.053
Record keeping	19.20463	14.74906	1.30	0.196
Experience	2.383374***	.8139831	2.93	0.004
Savings	0.3439626*	0.1903137	1.81	0.074
Household size	8.552982***	2.111163	4.05	0.000
Number of obs.	110			
F-statistic	57.36			
Prob. > F	0.000			
R ²	0.8374			

Note: Dependent variable is Gross margin.

*p = 0.1.

**p = 0.05.

***p = 0.01.

Access to credit was estimated to have a positive significant influence at 5% confidence level on gross margin of shea butter production. The implication is that shea butter producers who have access to credit are observed to make higher gains in terms of gross margin compared to their other counterparts who do not have similar access. Experience was observed to have a positive effect on the profitability of butter producers. This finding could be interpreted to mean longer years of experience in the business equips processors with the required capacity to produce quality shea butter which meets the market standards. It is statistically significant at 1% confidence level. Deng et al. (2017) also observed a positive effect of experience of butter processors on their profitability. Savings was also estimated to have a positive relationship with gross margin at 10% significant level. This means that the culture of savings especially when it is reinvested into the shea butter business has the potential to increase profits because producers will be in a position to purchase required inputs at the right time to warrant the necessary expansion of production. Household members are largely relied on for labour to produce shea butter. It was observed to have a positive influence on gross margin and statistically significant at 1%. This observation is in line with the findings of Mohammed et al. (2013).

The coefficient for the R^2 of 0.8374 means that the explanatory variables (regressors) explain 83.74% of the total variation in the dependent variable (regressand); the gross margin and the remaining 16.26% of variation is as a result of factors not captured in the model. That is the error term. Similarly, the F -statistic is observed to be statistically significant at 1%. This also means that all explanatory variables put together significantly influences gross margin of shea butter.

4. Conclusion and recommendation

This paper assessed the profitability of small scale local shea butter production in Ghana employing profitability analysis technique to estimate gross margins, net incomes and net return on investments of producers. Determinants of profitability were also identified and estimated by applying linear regression model. The result of the study shows that small scale local shea butter production in the study area is profitable as indicated by the positive average values of gross margin, net income and net return on investment. This implies that small scale shea butter making has the capacity to enhance living standards of women participants and empowering them. It was also observed that access to market information, access to credit, length of production cycle (time), experience, savings behaviour and household size significantly determined the profitability of butter making. This means that producers who have better understanding of the marketing dynamics especially through interaction with colleagues in cooperatives are confident to negotiate prices and other terms of trade to increase profits. Reliable access to low cost credit fast tracks processes in production that requires financial resources. By way of recommendation, existing shea butter producer groups and cooperatives should be strengthened while attracting non-members so as to make their collective voices loud to access market information required to increase their profits. Such groups should also endeavour to train its members in effective enterprise management such as time management in the production process, record keeping, and standardization among others. Stakeholders such as local government and development organizations should promote local shea butter making and link it to potential markets both locally and international in order to boost the local economy. Microcredit and financial institutions should also explore the potential of the small scale local shea butter industry and develop lending models with low cost suitable for shea butter producers.

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Authors' contributions

Theophilus Tweneboah Kodua and Jacob Ankamah designed the study and wrote the protocol, Theophilus Tweneboah Kodua, Jacob Ankamah and Mary Addae collected the data, Theophilus Tweneboah Kodua and Mary Addae analyzed the data, Theophilus Tweneboah Kodua, Jacob Ankamah and Mary Addae drafted and reviewed the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare no competing interest.

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