

Small-Scale Shea Butter Processors and factors influencing their access to Innovation Support Services (ISS)

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Abstract: The goal of the study was to look into the variables affecting small-scale shea butter processors' access to innovation support services (ISS). 181 small-scale shea butter producers in 16 administrative districts in the Northern Region provided the study's data. According to the research, 88% of businesses had access to services that supported innovation. These services can be acquired through one's business or business group, clients, rival businesses, as well as suppliers. According to the results of the logistic regression model, a firm's ability to acquire support services for innovation is significantly influenced by its age, group membership, manager's sex, and manager's nationality. The model generated values for Pseudo-r-squared, Chi-square, and Prob > chi2 of 0.164, 21.274, and 0.031, respectively.

Keywords: Innovation, small scale firms, shea butter, innovation support services, products, shea industry, access, nature of innovation, enterprise group.

INTRODUCTION

The Shea butter tree, *Vitellaria paradoxa*, is one of the prominent natural and economic resources in Sahelian Africa gaining increasing recognition as a result of its penetration and flourishing trade in the global market (Elias, 2013). Internationally, Shea butter is chiefly used across industries in Europe and North America, including those in the food industry for the manufacture of confectionaries such as biscuits, chocolates, pastries, in the pharmaceutical industry for balms and the cosmetic industries for the production of soaps, candles, creams, makeups and hair foods (Eneh, 2010). It is estimated that the shea butter is produced in 19 African countries employing more than 13 million women (FAO, 2014).

According to (Lovett & Haq, 2000) Ghana is among the leading producer and exporter of Shea butter in the world with the northern region among the prominent producing and processing ecological regions in Ghana. Shea butter is a byproduct of Shea nuts and therefore, the skill and art of processing has been a long standing practices among women in the over thirty different ethnic tribes in the Shea belt communities of Northern Ghana (Elias & Carney, 2007). Extraction and processing of the Shea butter for the Shea nut involves the use of various technologies which varies from different people and groups with the region.

Consequently, the use of the traditional technologies leads to the production of low quality Shea nuts that command low prices in the global market (Igwe et al. This suggests that the traditional process method accounts for large quantities of unprocessed Shea-nuts annually, especially during years of bumper harvest and subsequently attract low price due to poor processing and packaging arrangements. Unfortunately, most of the households engaged in the Shea-butter production business in the northern region of Ghana are logistically and technologically handicapped, making it difficult for them to gather more fruits which subsequently reduce both quantity and quality of butter produced.

As a result, the issues of small scale firms' access to innovation support services have become central to researchers and have received intense interest in the innovation literature over the

last two decades (Elias & Carney, 2007). Some the most notable studies includes Okorley et al. (2011), Issahaku et. al., (2012), Issahaku, Sapong & Al-hassan (2012), Theophilus et al. Okorley et al. (2011) estimated and compared the allocative efficiencies of the traditional and improved shea butter processing technologies. The allocative efficiency for labour indicated that input is over utilised in the traditional methods of processing and underutilised in the modern methods of processing.

The aforementioned studies have the following shortcomings. They all could not explore the ability to innovate among small holder shea butter processors either within the process of production or in the final product itself. Again, these studies did not capture the issue of innovation support service for small businesses in the shea industry. This current study sought to close these gaps by examining the factors influencing access to innovation support services (ISS) among small-scale firms in the shea butter sub sector.

If small scale businesses are helped to get over the barriers to innovation in marketing, finance, technology, or management, significant positive externalities from the shea butter industry could be harnessed (Castells and Hall, 1994; Klofsten et al., 1998). If small scale businesses are helped to get over the barriers to innovation in marketing, finance, technology, or management, significant positive externalities from the shea butter industry could be harnessed (Castells and Hall, 1994; Klofsten et al., 1998). Understanding the type of innovation support service systems used by small-scale shea butter processors in Ghana's northern area is crucial.

Theoretical Framework

The Triple Helix Model of Innovation serves as the theoretical foundation for this study. The theory holds that society needed a "progression of interactions concerned with the various sectors; "vertices": "government (G); the productive structure (E); including private and government-owned companies; and the science-technology infrastructure (I), including universities, public and private R&D centers" (Etzkowitz & De Mello, 2004). Following that, Sabato put out "a set of three types of relationships among the elements of the triangle: intra-relations (inside each vertex), inter-relations (among the vertices), and extra-relations

(with the government controlling the two other vertices)" (Etzkowitz & De Mello, 2004).

This idea of progress, according to Etzkowitz and De Mello (2004), was predicated on the government producing a process of significant interrelations among the three vertices. Etzkowitz and Leydesdorff (1995) expanded on this concept and later dubbed this network of relationships the Triple Helix model of innovation. The Triple Helix model is a "spiral model of innovation, which is able to capture various reciprocal linkages at different stages of the capitalization of the knowledge," according to Etzkowitz and Leydesdorff (1997). According to their claims, the Triple Helix model will serve as the cornerstone of any national or international innovation agenda in the twenty-first century. According to Godin and Gingras (2000), the Canadian government has emphasized on the need to forge and support greater linkages between universities and industries through new policies and strategic programs over the previous 20 years.

The Triple Helix concept gives a lot of weight to how universities interact with other organizations, particularly when it comes to fostering regional innovation. These actors in this institutional web are the propellers and providers of innovation support services.

The Concept of Innovation

Literature provides different definitions of 'innovation'. Joseph Schumpeter is often considered the first economist to draw attention to the importance of innovation. Innovation is closely related to development in Schumpeter's theory: indeed, economic development is driven by the discontinuous emergence of new combinations (innovations) that are economically more viable than the old way of doing things (Swedberg, 2009). In the second half of the 20th century innovation theory was in particular furthered by three approaches to understanding technological change: induced innovation, the evolutionary approach, and the path-dependent model.

Innovation Support Service

Enterprises that provide business support services can be designated as Innovation Support Service (ISS) providers. From an economic standpoint, Albert (2007) makes a distinction between actors on the supply and demand sides. He stresses the need for them to prepare for their contacts. These interactions are viewed as functional links within the service system, which contains a variety of elements that need to be investigated (financing, delivery,

insurance), as well as the interaction of participants in the creation of the services and the administration of those services (mode and techniques).

Advisory services, extension organizations, brokers, bridge organizations, mediators, border organizations, etc. are a few of the names given to service providers in the literature. These, however, do not adequately represent the variety of innovation support sources. The public or private character of these service providers may account for their variance.

Public institutions will need to focus more on policy analysis, quality assurance, and regulation as commercialized innovation support providers proliferate. However, in systems that foster innovation, universities play a number of different functions. NGOs have become significant players as a result of the private sector's better human and financial resources as well as its more democratic political systems. According to Alex (2010), NGOs can either serve as "service providers," providing customers with direct services, or they can serve as "institution builders."

Methodology

This study's research design is a descriptive one that aims to describe the current state of the topic under investigation. In order to describe the fundamental aspects that surround the issue under consideration, this descriptive approach entails the routine collection, analysis, and interpretation of a set of data.

A field survey of the shea enterprises within the study area that made up the study sample was used to gather cross-sectional data. Managers of Shea Enterprises were given questionnaires to complete. Because there has never been a national census in Ghana that addresses issues of innovation among small businesses, the choice to use primary data became unavoidable.

The Global Shea Alliance listed 455 enterprises and cooperatives as shea butter processing businesses in Ghana. Out of this number, 332 operate within the sixteen (16) administrative districts of the Northern Region of Ghana. This study therefore targets the shea butter processing businesses that operate within the Northern Region of Ghana. Table 2 shows the number of firms listed in each district and number selected into the sample size.

Table 2: Sampling size

Name of District	District Capital	No. of firms	Sampled firms
Tolon	Tolon	13	5
Tatale/Sanguli	Tatali	10	5
Sagnarigu Municipal	Sagnarigu	23	10
Savelugu Municipal	Savelugu	16	10
Mion District	Sang	19	10
Nanton District	Nanton	11	5
Gushiegu Municipal	Gushiegu	18	8
Karaga District	Karaga	17	10
Kpandai District	Kpandae	28	5
Nanumba North	Bimbilla	27	11
Nanumba South	Wulensi	21	8
Saboba	Saboba	20	12
Tamale Metropolitan	Tamale	44	31
Kumbungu	Kumbungu	19	12
Zabzugu	Zabzugu	13	10
Yendi Municipal	Yendi	33	29
Total		332	181

Source: Alabani (2022)

Sample Size and Sampling Techniques

As a result of the constraints of time and other resources a sample has been chosen because it is virtually impossible to study the entire population of small shea butter producing businesses around the Northern region. In comparison to the use of a census, samples do give reliable information while using significantly fewer resources (money, time, and labor) (Afful Jr., 2010). However, the sample must be representative of the population from which it is drawn (Oluwatosin, 2021). In order to determine the sample size, the researcher used the Taro Yamane formula at 5% level of significance.

Yamnane (1967) formular:

$$n = \frac{N}{1+N(e)^2}$$

Where

n	=	sample size
N	=	Population of the study
e	=	level of significance/Error estimate at 5%
1	=	Constant

Selecting a sample out of the total study population;

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{332}{1 + 332(0.05)^2}$$

$$n = \frac{332}{1 + 332(0.0025)}$$

$$n=181.4207$$

Therefore, the sample size is 181.

Research Instrument

The instrument used in collecting the data for this study was a questionnaire that asked managers to respond to a set of question items. The questionnaire was designed to collect data that would satisfy the objective and conceptual framework of the study. The logistic regression was employed to identify factors influencing a firm's access to innovation support services.

Econometric Model

Whatever type of innovation occurs, it is driven by a number of variables in a relationship. Hence the probability of innovation occurring would be based on an interplay of such variables. Traditionally, these relationships can be expressed as follows:

$Y^* = \beta X + \mu$ where X is observable and Y^* is the outcome variable.

$$\begin{aligned} Y &= 1 & \text{if } \beta X + \mu > 0 \\ Y &= 0 & \text{if } \beta X + \mu < 0 \end{aligned}$$

Y represents the firm's access to innovation support service (ISS). X represents the exogenous explanatory variables; the factors influencing access to ISS. The conditional probability of getting access to ISS at the enterprise level is given as:

$$E(Y_i^* / x_i), \text{ which gives a prob } (y_i = 1) = \text{prob } (\mu > -\beta x_i)$$

$$\begin{aligned} &= \Delta(\beta x_i) \\ &= \exp(\beta x_i) / (1 + \exp(\beta x_i)) \end{aligned} \quad (1)$$

This expression is a logistic model of the logit type. The researcher therefore estimated a logistic model as expressed in equation (1)

Empirical Model

The full estimation model can be expressed as follows:

Prob (Access to ISS) =

$$\beta_0 + \beta_1 \text{FINFINage} + \beta_2 \text{FINFINgroup} + \beta_3 \text{FINFINedu} + \beta_4 \text{FINFINloc} + \beta_5 \text{FINFINemp} + \beta_6 \text{SEXmgr} + \beta_7 \text{AGEmgr} + \beta_8 \text{NATIONAmgr} + \mu \quad (2)$$

Table 3: Summary of dependent and independent variables in the logit model

Variables	Description
Dependent variables	
Access to ISS	Factors influencing a firms' access to innovation support services.
Independent variables	
Firm Location	A rural setting has a population of less than 5,000 people and an urban setting has a population of 5,000 or above.
Firm Size	Number of employees: 0 - 5 Microenterprises 6 - 9 Very small enterprises 10 - 29 Small enterprises 30 - 140 Medium enterprises
Firm age	21 - 30 years 31 - 40 years 41 - 50 years 51 - 60 years 61+ years
Medium of skills acquisition	How firms manager acquire skills to work: Formal, informal or Both
Received training from abroad	Firm managers who received training from outside of Ghana
Received training in Ghana from a foreigner	Firm managers who received training from foreigners inside Ghana
Level of education of the Manager	University Polytechnic Training College Technical/Vocational Secondary/Commercial J.H.S Primary Non
Training and Development	Number of workshops attended
Age of the Manager	21 - 30 years 31 - 40 years 41 - 50 years 51 - 60 years 61+ years
Gender of the Manager	MALE FEMALE

Source: Alabani (2022).

Findings and Discussion of Results**Nature of Innovation**

Data was collected to examine the nature of innovations among firms. By nature of innovation we sought to find out whether an innovation is new to the Ghanaian market or is new to the innovating firm only. Over 80% of innovated activities identified were classified as new to the innovating firm only and less than 20% of the innovations were classified as new to the Ghanaian market. Figure 1 presents a bar graph of the nature of innovation among firms.

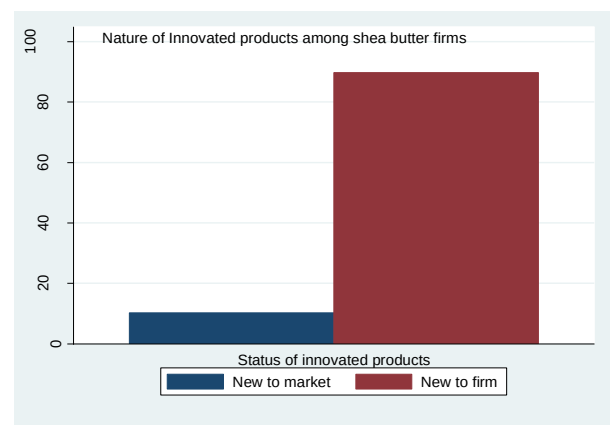
**Figure 1: Nature of innovation****Access to Innovation Support Services (ISS)**

Table 4 shows Innovation Support Services (ISS) identified among shea butter production firms in the study area. They included support within ones enterprise or enterprise group, clients or

customers from the public or private sector, competitors or other enterprises in the industry as well as suppliers of equipment, materials & components. In addition, support from professional and industry associations is available from consultants and commercial labs, universities or other higher education institutions, government, public, or private research institutes, conferences,

trade shows, and exhibitions. These support services were ranked in terms of their degree of importance to these firms. The most relied upon support services was “within ones enterprise or enterprise group” followed by “universities or other higher education institutions”.

Table 4: Ranking of ISS

Label	ISS	Rank
SENTG	Within your business or business group	1st
SCLRP	Equipment, materials, or component manufacturers	8th
SPRO	Either governmental or private sector clients or consumers	3rd
SCOM	Competitors or businesses in your sector	5th
SSUP	Consultants and private laboratories	4th
SGMT	Universities as well as other institutes of higher learning	2nd
SINS	Governmental, local, state, or private research institutions	6th
SCON	Conferences, trade shows, and exhibits	10th
SUNI	Trade magazines and technical publications	9th
SPR	Organizations for professionals and industries	7th

Source: Alabani (2022)

Figure 2 contains the mean comparison of all ISS presented to show the mean degree of importance of these services to firms.

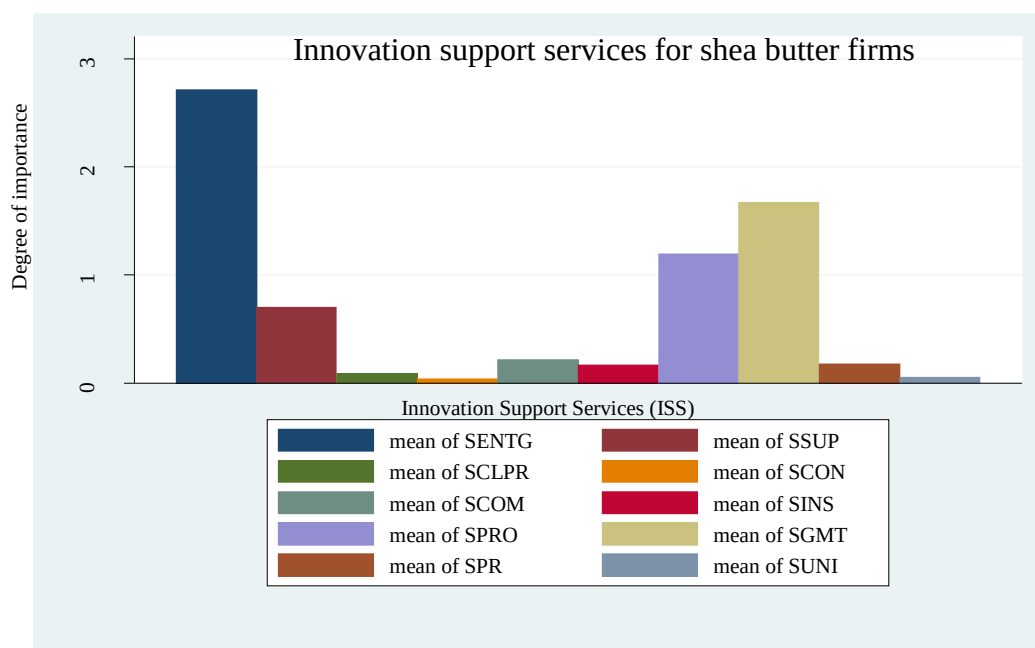


Figure 2: Innovation support services

Source: Alabani (2022)

Firms were asked a yes or no question as to whether they do get access to these ISS mention in figure 2. The answers are capture in figure 3.

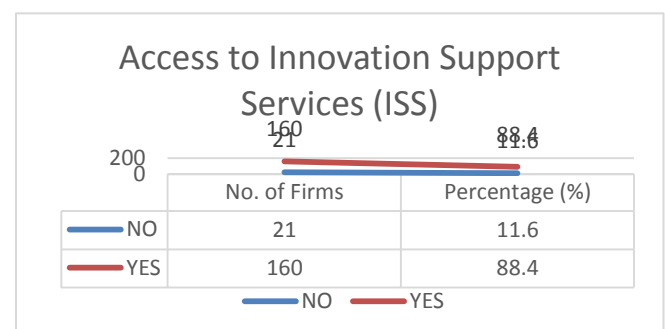


Figure 3: Access to ISS

Source: Alabani (2022)

Logistic regression results: Factors influencing the access to ISS

Table 5 presents the logistic regression results analysis performed on factors that influence a firm's access to innovation support services. Access to innovation support services is captured as a dependent variable and eight independent variables (firm age,

belongingness to a group, and educational level of the manager, location of the firm, employment, sex of the manager, age of the manager and nationality of the manager). The model specification is good given the Pseudo r-squared value of 0.164, Chi-square value of 21.274 and Prob > chi2 of 0.031.

Table 5: Logistic regression results: Factors influencing the access to ISS

ACCESSISS	Coefficient.	Odds Ratio	Std. Err.	P>z
FINFINage	3.32	3.320481*	2.237493	0.075
FINFINgroup	2.92	2.91989*	1.826796	0.087
FINFINedu	-1.562	1.561918	1.019174	0.494
FINFINloc	2.045	2.045406	2.634867	0.579
FINFINemp	-1.193	1.193223	1.43038	0.883
SEXmgr	0.208	0.2084136**	0.1157202	0.005
AGEmgr	0.961	0.9609835	0.0243398	0.116
NATIONAmgr	8.425	8.425002*	9.592099	0.061
_cons	25.749	25.74862	75.62474	0.269
Mean dependent var	0.884	SD dependent var	0.321	
Pseudo r-squared	0.164	Number of obs	181	
Chi-square	21.274	Prob > chi2	0.031	
Akaike crit. (AIC)	132.66	Bayesian crit. (BIC)	171.038	

Source: Alabani (2022)

Note: ** indicates significance at 5% and * indicates significance at 10%.

Firm Age: The positive sign associated with the coefficient of the firm age variable means that firm age is positively related to access to innovation services. This variable is significant at 10%. Thus, a younger firm would have 3.320 of the odds of getting access to innovation support service.

Belongingness to a Group: The positive sign of the coefficient of this variable means that belonging to a group is positively related to accessing innovation support service. This variable is significant at 10%. A firm that belongs to an enterprise group would have 2.919 of the odds of getting access to innovation support services.

Sex of the Manager: The positive sign of the coefficient of this variable means that the sex of the manager is positively related to accessing innovation support service. This variable is significant at 5%. Firms with female managers have 0.2084136 of the odds of getting access to innovation support services as compare to firms that had male managers.

Nationality of the Manager: The positive sign of the coefficient of this variable means that the nationality of the manager is positively related to accessing innovation support service. This variable is significant at 10%. Firms that had Ghanaian managers have 8.425002 of the odds of getting access to innovation support services compare to firms that have non Ghanaian managers.

Others: All the other independent variables (educational level of the manager, location of the firm, employment, age of the manager) and the constant term are all insignificant.

These findings are in tandem with the work of Etzkowitz and Leydesdorff (1997) who found that universities are altering their missions, forming new connections with industry, and becoming more entrepreneurial in this dynamic new context.

Summary and Conclusion

The data showed that 88% of firms have access to some form of innovation support service. The logistic regression results showed that firm age, belongingness to a group, sex of the manager as well as the nationality of the manager were positive and significant factors that determine a firm's ability to access an innovation support service. These services include assistance from one's own company or group of companies, clients or customers from the public or private sector, rival companies or other businesses in the same industry, as well as equipment, material, and component suppliers. In addition, support from professional and industry associations is available from consultants and commercial labs, universities or other higher education institutions, government, public, or private research institutes, conferences, trade shows, and exhibitions.

Recommendation

Innovation is not a preserve of the giants; every small firm can innovate to grow its product lines and services. As a result, it is recommended here that owners' and managers of small shea firms should put more efforts into networking and building strong enterprise groups that would act as an incubator platforms for all small business to attached, learn and grow. There is the need for the government of Ghana through the Ministry of Trade and industry to support small but innovative shea firms to access larger markets. This could be done through capacity building and the provisioning of technical support services. This would not only

help to create employment, it would also improve the country's foreign exchange earnings and thereby lesson the fast depletion of the Ghanaian currency.

Despite the claims of access to ISS, growth of most scale firms is still slow and in some cases non-existent. Over the period, a lot of such firms have even folded up. The nature of innovations are also "non-radical" and largely a "new to firm" kinds of innovations. Much more still need to be done to deepen the interaction between the various actors in the shea sector. These interactions should involve the three cardinal pillars of the triple helix model; government, industry and the academia.

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