SOCIO-ECONOMIC CHARACTERISTICS OF GERMAN INTERNATIONAL CORPORATION (GIZ) TECHNOLOGY INTERVENTION ON SHEA NUT PROCESSORS IN NIGER STATE, NIGERIA.

ABSTRACT

This study assessed the activities of GIZ (German International Corporation) intervention technology on shea nut processors in Niger State, Nigeria. A two-stage sampling technique was adopted for the study. The first stage involved a purposive selection of 15 Local Government Areas of GIZ's intervention. The second stage involved a proportionate random selection of 297 beneficiaries constituting 10% processors in the GIZ profile list. Also, in the same LGAs, snow-balling technique was used to randomly select 297 Shea nut processors that were GIZ non-beneficiaries, thereby making a total sample size of 594. Data were collected through interview schedule and were analysed using percentages and mean and multiple regression analysis. The study revealed that majority (75.1 %) of the respondents had non-formal education, 76.6 % were between 41-60 years with mean age of 48.1 years. All the respondents (100.0 %) were female and married with average of experience of 15.5 years. The most severe constraints were; inadequate funding ($\bar{x}$=1.875), poor market channels ($\bar{x}$=1.737) and inadequate extension contact ($\bar{x}$=1.542), and there was positive relationship between some selected socio-economic characteristics and the level of adoption of GIZ's technologies (F=23.59, p <0.001). The results from this study showed that the processors were constrained by inadequate fund, poor market channels and inadequate extension services because the gap from the existing one is lower before the intervention of GIZ Shea nut technology due to high quality of production of premium shea butter produced by the beneficiaries which attracted income. The continuity of the GIZ's intervention with effective extension services and provision of credit facilities to ameliorate the problem of inadequate fund is highly recommended.

Keywords; Beneficiaries, Shea nut, Processing technology, German International Corporation **(**GIZ) and Intervention

INTRODUCTION

Shea tree (*Vitellaria paradoxa*) is a resourceful tree crop that grows wild across sub-saharan Africa. It is also an interesting and wonderful tree crop because of its importance and high economic contributions to several World markets. According to Maranz;Wiesman, *(*2003a) and Masters;Yidana; Lovett (2004), it covers about 5000 km wide belt of savanna including West African countries of Senegal, Mali, Côte d'‟Ivoire, Burkina Faso, Togo, Ghana,

Benin, Nigeria, Niger, Cameroon, and further east in Uganda, Sudan and Ethiopia (Chalfin, 2004 and Goreja, 2004). The area covered by the shea parkland is called "Shea belt" amongsheamerchants **(**Ferris, Collinsom, Wanda, Jagwe, and Wright, 2001)**.** The shea fruit servesas a nutritional supplement to African diets especially the rural dwellers. For example in Nigeria and Ghana, farmers consumed the fruit as desert crop during farming activities when the staple and cash crops are under cultivation. (Teklehaimoanot, 2004; Suleiman, 2008 and Pouliot, 2012). The wood derived from shea tree is of good quality, strong and resilient timber for making farming tools, and can also be used as fuel for cooking. Shea butter can be manually or mechanically extracted from Shea seeds. It contains 85-90% stearic and oleic acid. The Shea butter extracted from the seeds may contain up to 50% oil and when refined, it is also used as a substitute for margarine and cocoa butter in the food industries. It is important to note that Shea butter tree is next to oil palm as second most valuable oil crop in Africa (Alander, 2004; Moore, 2008 and Suleiman, 2008)).

Currently, Shea nut and Shea butter are exported from African countries, including Nigeria, to France, Great Britain, the Netherlands, Denmark, North America, and Japan (Elias and Carney, 2007). In these countries, it is processed into extensive range of food products including chocolate and it is becoming more acceptable in the cosmetic industry (Schreckerberg, 2004).

In Nigeria, Niger state ranked first among the shea nut producing states, followed by Kwara, Nasarrawa, Zamfara, Kaduna, Sokoto, Jigawa, Kano, Plateau, Taraba, Benue, Adamawa, Bauchi, Kebbi, Edo,Yobe and Federal Capital Territory (FCT), Abuja. At present, there is tremendous improvement on demand for Shea oil (Shea butter) for industrial applications in food, cosmetics, pharmaceutical and traditional usage at national and international levels and this calls for the attention of farmers and government at all levels to utilize available opportunities of the industry (Suleiman, 2008).However, Niger state traditional Shea nut processors are constrained with adequate knowledge, technical know-how and lack of training on the improved shea nut processing technologies as determinant for quality Shea nut and butter as well as good marketing opportunities at the local and international outlets. The objectives of the study were to describe the socio-economic characteristics and to identify constraints to the adoption of the beneficiaries and non- beneficiaries of GIZ processing technologies in the study area.
The production of sheabutter has the economical potentials to sustain shea trees *(Vitellaria paradoxa)* if shea nuts processing is carried out using improved practice for income generation in rural areas. The product is one among Non-Timber Forest Products (NTFPs) derives largely from off-reserve forests in many parts of Africa. This is to enhance local livelihood and contribute to environmental sustainability through biodiversity conservation (Ahenkan and Boon, 2010; Godfred *et al*.,2015). Aboyella (2002) has noted that shea nuts processing and trading are a major income generating activities that offer employment to rural women and children. In Aboyellas view, sheabutter extraction plays a significant role in poverty alleviation and food security. However, the potential of shea nuts and butter in conserving vulnerable species and reducing the rural poverty. Lovett (2004) concluded that sheabutter is a high–value export to Europe and the United States, where it is considered a luxury.

Also, environmental benefits were found in the shea industry by way of shea tree conservation, ecosystem benefits, and reduction in GHG emissions and from environmental vulnerabilities. Additionally, social benefits by way of women empowerment, capacity building and community
transformation were also found. However, challenges like legal restrictions curbing the quantity of shea used in chocolate products, standardisation, threats to shea trees, limited protection laws for shea trees and most especially disconnection of shea nut pickers from evenly benefiting from the industry acts as trade barriers which curbs the industry's development and affects its economic, social and environmental opportunities. Nonetheless, these challenges were seen as insufficient to inherently offset or take away the industry 'scapability to facilitate Sustainable Development. Furthermore, the industry's capacity to help alleviate poverty through its economic, environmental and social opportunities as well as provide access and participation of the poor living in shea plants in Niger state and other producing states respectively inviable economic endeavours were seen to be significant

Fundamentally, economic activities and product output accounts for increased GDP and to a large extent reflects a country's potential for economic growth. This study explores the Shea industries economic opportunities through the economic activities realised from the Shea-Value-Chain, production outputs and products derived.

MATERIALS AND METHOD

The Study Area

The study was conducted in Niger State which is located in the North Central zone of Nigeria and has its capital in Minna. It lies between latitude 3°–10°N and longitude 3°–8°E. It is bordered by Kebbi and Zamfara States to the North-West and to the South by Kwara and Kogi States while Kaduna State and the Federal Capital Territory (FCT) bordered the State to the East and South-East respectively. The State also shares a common international boundary with the Republic of Benin at Babanna in Borgu Local Government Area of Niger State. This gives way to common inter-border trade with the State. The State has a land mass of 76,363 Km^2making it the largest State in Nigeria in terms of total land area and has twenty-five (25) local government areas. The State has the highest wild Shea tree plantations in Nigeria with a substantial number of traditional rural processors of Shea nut which cut across the agricultural zones of the State (Suleiman, 2008). It is divided by Niger State Agricultural Development Programme into three agricultural zones for better agricultural administrative activities, namely: zone, I, II, and III with headquarters at Minna, and the zones have their headquarters at Bida, Kuta, and Kontogora respectively. A multi-stage sampling method was used and three (3) sampling technique was adopted for the study. The representativeness of the samples were probability sample which was GIZ Shea nut processor groups and non probability sample which was non-GIZ nut processor groups in the selected local government arears.this was based on snow balling technique to get the same number of the shea nut processors.

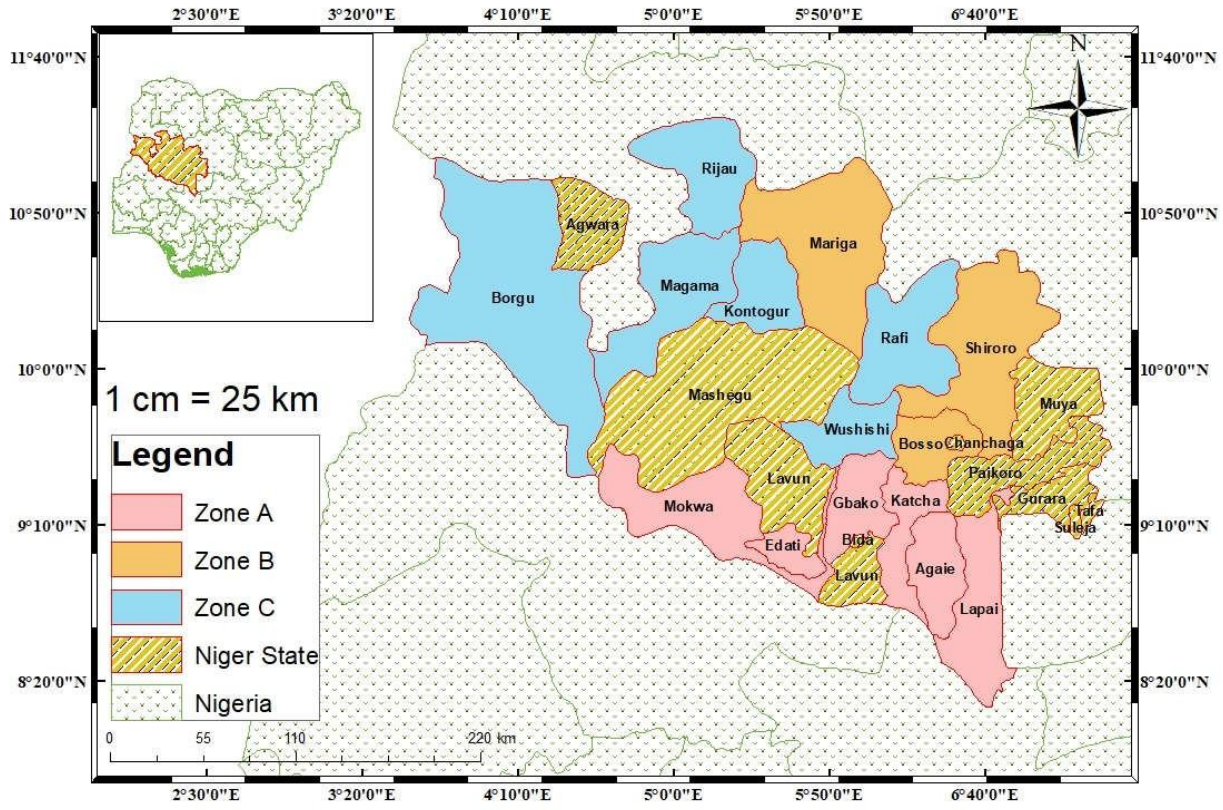

Figure 1: Map of Niger State showing Local Governments of GIZ Intervention

Source: GIZ Shea processors profile list, 2011; 2014

In order to have a wide coverage and full representation, all the three Agricultural Development Programmes (ADP) zones were used for the study. A 3-stage sampling technique was adopted for the study. In the first stage, a purposive selection of 15 Local Government Areas (LGAs) of German International Corporation (GIZ) intervention site was made (GIZ, 2011; 2014) across the three zones. The purposive selection was carried due the fact that there was high population density of Shea trees and high participation of Shea value chain particularly Shea processing activities. At the second stage, from the profile list of GIZ Shea groups comprising 2970 processors GIZ, 2011; 2014 profile lists, a proportionate random selection, based on 10%, of Shea nut processors were made across the selected LGAs giving a total sample of 297. The third stage involved the use of snow-balling technique to randomly select equal number (297) of Shea nut processors who were non-beneficiaries (non-registered Shea nut processors) in the same 15 selected LGAs to have a genuine comparison effects, thereby making a total sample size of 594 that was used for the study (Table 1).

Table 1: The Distribution of the Sample Shea Nut Processors (Beneficiaries and Non-Beneficiaries)

Local govern-ent areas	Sample frame (No of GIZ processors as contained in the profile list of GIZ Shea groups in Niger State)	No of selected GIZ beneficiaries through proportionate sampling based on 10%	No of selected GIZ non-beneficiaries	Total sample ofGIZ beneficiaries and non-beneficiaries
Zone A				
Lapai	297	30	30	60
Gbako	240	24	24	48
Katcha	313	31	31	62
Mokwa	243	24	24	48
Agaie	89	9	9	18
Edati	123	12	12	24
Zone B				
Shiroro	81	8	8	16
Bosso	289	29	29	58
Mariga	63	6	6	12
Zone C				
Kontagora	159	16	16	32
Borgu	445	45	45	90
Wushishi	146	15	15	30
Magama	379	38	38	76
Rijau	72	7	7	14
Rafi	31	3	3	6
TOTAL	2,970	**297**	**297**	**594**

Source: Field Survey, 2018

Data Collection and Instrument for Data Collection

The data for the study was obtained from both primary and secondary sources. The primary data was collected through interview schedule. The secondary data was sourced from published and unpublished documents of agricultural journals, internet and past studies. Trained enumerators of the State Agricultural Development Programme office and extension agents were engaged in the study area to collect information from the respondents.

Analytical Techniques

Descriptive and inferential statistics such as frequency counts, percentages, mean, charts, Likert-type, regression analysis and ANOVA were used to achieve the objectives of the study.

Specification of Model

In testing the hypothesizes, the following statistical tools were employed;

The multiple logistic regression model for determination of significant relationship between adoption level of Shea nut processors and the processors socio-economic characteristics was used and was expressed as:

$Y= \beta_o +\beta_1X_1+ \beta_2X_2 +\beta_3X_3 + \beta_4X_4+ \beta_5X_5 +\ldots\ldots\ldots\ldots\ldots\ldots \beta_nX_n$ ….. (1)

Where

Y = 1 if the adoption level of the specified improved Shea nut processing technology is high, 0 if the adoption level is low

Age (X_1)

Marital status (X_2)

Household size (X_3)

Education (X_4)

Processing experience (X_5)

Gender (X_6)

Source of fund for Shea nut Processing (X_7)

Membership of Voluntary Organization (X_8)

Own Processing Centre (X_9)

Extension with contact (X_{10})

Training (X_{11})

Varaware (X_{12})

Had Improved Processing Technologies (X_{13})

Information Source (X_{14})

Information Type (X_{15})

Type of Associations (X_{16})

Income (X_{17})

Quantity of shea nut/butter (X_{18})

All these variables represent the vector of explanatory (independent) variables and β, was the coefficient of parameters that was estimated.

RESULTS AND DISCUSSION

In dermination of regression model, multiple regression model and analysis was used to determine the relationship between the selected socio-economic characteristics and the level of adoption of GIZ technology. Also, from the durbin Watson results, 507 showed high correlation and thereby indicated the presence of auto-correlation to the estimated residual values. Moreover, selected socio-economic characteristics such as education, processing centre, contact with extension agents, quantity of Shea nut processed, average monthly income, membership of cooperative societies and degree of cosmopolite –ness were significant at 0.5 percent. While age, sex, marital status, household sizeand source of information were not found significant.

Table 2: Distribution of Respondents by Age, Gender, Marital status and Educational status.

Social Economic Characteristics	Beneficiaries		Non-Beneficiaries		Pooled	
	Frequency (N=297)	Percentage	Frequency (N=297)	Percentage	Frequency (N=594)	Percentage
Age						
<30	27	9.1	15	5.1	42	7.1
31 – 40	20	6.7	50	16.8	70	11.8
41 – 50	122	41.1	101	34.0	223	37.5
51 – 60	121	40.7	111	37.4	232	39.1
>60	7	2.4	20	6.7	27	4.5
Total	297	100.0	297	100.0	594	100.0
Mean	48.2		48.2		48.2	
Gender						
Female	297	100.0	297	100.0	594	100.0
Marital status						
Married	297	100.0	297	100.0	594	100.0
Educational status						
Primary						
	59	19.9	41	13.8	100	16.9
Islamic	204	68.7	218	73.4	422	71.0
Secondary	15	5.1	15	5.1	30	5.1
Adult Education						
	19	6.3	23	7.7	42	7.0

Total	297	100.0	297	100.0	594	100.0

Source: Field Survey, 2018

Table 2 shows the percentage distribution of Shea nut processors by age. The data revealed that majority (76.6%) of the respondents were between 41-60 years, 4.5% fell in the age group of 61 years and above while only 18.9% were relatively young in the category of 30-40 years with mean age of 48.2 years. In the case of beneficiaries of the intervention, majority of the respondents (81.8%)were in the age range of 41-60, 2.4% were the aged ones ranging from 61 years and above while the relatively young processors were few (15.8%) with mean age of 48.2years. In the case of non-beneficiaries, also majority of the respondents (71.4%) were in the age range of 41-60 years (6.7%) were aged processors and (21.9%) were relatively young with mean age of 48.2 years. This implies that majority were agile and in their active productive age, thereby indicating that there is future for Shea nut processing activities because the respondents were at their average ages of active participation in processing. The result disagrees with the findings of Daur *et al.* (2014) which revealed that about (42.0 %)of beneficiaries of FELD belonged to young age group.

Table 2 shows the percentage distribution of the Shea nut processors by gender. The data indicates that all the respondents (100.0 %) were female. This implies that the Shea nut processing is gender sensitive and it is purely a woman domain. The reason that could be adduced to this might be because men cannot exercise patience to go through all the Shea butter processing stages. This finding agrees with that of Julius (2007) which stated that across the African Shea zone, women are the traditional custodian of the Shea resources, with responsibility and control over all the stages of processing from collection of the fruits to transformation and marketing of Shea butter.

Table 2 also showed the percentage distribution of the Shea nut processors by marital status. The data reveals that all the respondents (100.0 %) were married. This indicates that the respondents had family responsibilities to cater for ranging from feeding, medications, education and other social activities. The result agrees with that of Ahmed (2009) that majority of the rural farmers/processors were married and from farming household.

Table 2 indicated that the percentage distribution of the Shea nut processors by education. It was shown in Table 2that majority of the respondents (78.1%) went through non-formal education (Islamic education and adult education classes), followed by primary education (16.8%) and secondary education (5.1%). Furthermore, in the case of beneficiaries of GIZ intervention, (75.1%) had non-formal education (Islamic education and adult education classes), followed by primary education (19.9%) and few (5.1 %) had secondary education. Similarly, in the case of non-beneficiaries, majority of the respondents (81.1%) went through non-formal education (Islamic education and adult education classes),s while 13.8% had primary education and few (5.1%) had secondary education. This implies that majority of the respondents attended non- formal educational system while few had primary and secondary

education. The result disagrees with findings of Mandloi (2007) who found that majority of the farmers in his study had primary education.

Table 3: Distribution of Respondents by Household size, Religion, Processing Experience and Quantity of Shea nut processed.

Social Economic Characteristics	Beneficiaries		Non-Beneficiaries		Pooled	
	Frequency (N=297)	Percentage	Frequency (N=297)	Percentage	Frequency (N=594)	Percentage
Household size						
< 3	26	8.8	21	7.1	47	7.9
4-9	6	2.0	61	20.5	76	12.8
10 – 14	119	40.1	56	18.9	165	27.8
>14	146	49.1	159	53.5	306	51.5
Total	297	100.0	297	100.0	594	100.0
Mean	10		10		10	
Religion						
Islam	285	96.0	276	92.9	561	94.4
Christianity	12	4.0	18	6.1	30	5.1
Traditional	-	-	3	1.0	3	.5
Total	297	100.0	297	100.0	594	100.0
Processing Exp.						
< – 4	9	3.0	16	5.4	25	4.2
5 - 9	90	30.3	61	20.5	151	25.4
10 – 14	99	33.3	84	28.3	183	30.8
15 – 19	55	18.5	83	27.9	138	23.2
>19	44	14.9	53	17.9	97	16.4
Total	297	100.0	297	100.0	594	100.0
Mean	15		16		15	
Quantity of Shea nut processed (kg)						
20 – 100	9	3.0	21	7.1	30	5.1
101 – 200	35	11.8	92	30.9	127	21.4
201 – 300	134	45.1	146	49.1	280	47.1
301 – 400	30	10.1	21	7.1	51	8.6
401 – 500	46	15.5	10	3.4	56	9.4
501 – 600	24	8.1	7	2.4	31	5.2
601 – 700	6	2.0	-	-	6	1.0
701 – 800	8	2.7	-	-	8	1.4
above 800	5	1.7	-	-	5	0.8
Total	297	100.0	297	100.0	594	100.0
Mean	264.4		223.1		272.7	

Source: Field Survey, 2018

Table 3 shows the percentage distribution of the Shea nut processors by household size. The data indicates that majority of the respondents (79.3%) had large household size of 15 and above while the rest 20.7% had small household sizes with mean household size of 10 people.

In the case of beneficiaries, the table reveals that majority of the respondents (89.2%) had large household size of 15 and above people and few (10.8%) had small household sizes with mean household size of 8 people. Similarly, in the case of non-beneficiaries, the table shows that majority of the respondents (72.4%) had large household size of 15 and above people and few (27.6%) had small household sizes with mean household size of 8 people. This implies that processors had large household sizes and may have the opportunity of using member of their households to assist them in the processing of Shea butter and may therefore boost their working capacity. This is in line with Fakayode *et al.* (2013) who reported similar high value of between 6 and 10 household size of processors in Kwara State.

Table 3 shows the percentage distribution of the Shea nut processors by religion. From the Table, it is shown that, majority of the respondents (94.4 %) practiced Islam while few (5.1 %) practiced Christianity and only 0.5% were Traditionalists. For GIZ beneficiaries, majority (96.0 %) were Islamic faithful and minority (4.0 %) were Christian faithful whereas in the case of non-beneficiaries, majority of the respondents (92.9 %) were Islamic faithful and minority (6.1%) were Christians and few (0.3%) were Traditionalists. This implies that the respondents were more of Islamic faith, followed by Christianity and a few percentages of traditionalists in the study area.

Table 3 shows the percentage distribution of the Shea nut processors by years of experience. The data reveals that majority of the respondents (70.4%) were experienced Shea nut processors having processing experience ranging from years 10 to 20 and above while few (29.6%) were less experienced having less or equal 10 years of processing experience. However, the mean year of experience is 15 years. The Table reveals further that the beneficiaries of GIZ technology intervention were experienced as majority of them (66.7%) had above 10 years of processing experience, while the rest 33.3% were less experienced with a mean of 15 years, whereas in the case of non-beneficiaries majority (74.1%) were experienced processor and 25.9% were less experienced. with mean of 16 years. Generally, it could be seen that both GIZ beneficiaries and non-beneficiaries were experienced processors with average years of experience of about 15 or more. This concurs with the findings of Salawu and Ayanda (2014) who found that the majority of the respondents had high years of processing Shea nut experience in Kwara State

Table 3 shows the percentage distribution of the Shea nut processors by the quantity of Shea nut processed. The data in the Table shows that 47.1% processed Shea nut of 201-300kg in a year while 2.0 % processed over 700kg of Shea nut in the same period. The mean quantity of Shea nut processed is 272.68kg.For GIZ beneficiaries, 45.1 % of the

respondents processed between 201-300kg of Shea nut into Shea butter in a year and few (4.4 %) processed above 700kg of Shea nut in the same period with mean of 264.4kg. In the case of non-beneficiaries, 49.2 % of the respondents processed 201-300kg of Shea nut into Shea butter in the same period with mean of 223.10kg. This implies that the productive capacity of GIZ beneficiaries are about 41.3 kg greater than that of non- beneficiaries. This difference could be adduced to the additional skills and training acquired through GIZ intervention programme.

Table 4: Distribution of Respondents by Sources of Fund, Membership of Organisation, Contact with Extension Agents and Type of Association.

		Beneficiaries [N-297]		Non- Beneficiaries [N-297]		Pooled [N-594]	
		Freq	%	Freq	%	Freq	%
Source of fund							
	Personal savings	71	23.9	165	55.6	236	39.7
	Friends & family	30	10.1	132	44.4	162	27.3
	Cooperative societies	196	66.0	-	-	196	33.0
	Total	297	100.0	297	100.0	594	100.0
Membership of Voluntary Organisation							
	Yes	257	86.3	217	73.1	474	79.8
	No	40	13.5	80	26.9	120	20.2
Total		297	100.0	297	100.0	594	100.0
Contact with extension Agent							
Monthly		200	67.3	105	35.3	305	57.3
	Quarterly	75	25.3	81	27.3	157	46.3
	Yearly	22	7.4	111	37.4	183	22.4
Total		297	100.0	297	100.0	594	100.0
Type of association							
Non-membership		9	3.0	196	66.0	205	34.5
Social group		2	0.7	-	-	2	0.3

Farmers/ Processor cooperative union	286	96.3	101	34.0	387	65.2
Total	297	100.0	297	100.0	594	100.0

Source: Field Survey, 2018

Table 4 shows the percentage distribution of the Shea nut processors by source of fund.. The data indicates that processors had their source of fund from personal savings, cooperative society and friends/ family in the proportion of 37.9%, 33.0% and 27.3% respectively. In the case of GIZ beneficiaries, majority of the respondents (66.0%) had their sources of fund from cooperative societies, while few (10.0%) had their sources of fund from friends/families while 23.9% claimed to have their sources of fund from personal savings. For GIZ non-beneficiaries more than half of the respondents (55.6%) had their sources of fund from personal savings, 44.4% claimed to have their source of fund from friends/families and none having cooperative as source of fund. On the general note, it implies that greater proportion of the respondents/processors in the study area did source their fund from personal saving and none of the respondents took bank loan for the shea nut processing business. This is in line with the findings of Nkang *et al.* (2006) that personal savings constitute the major source of fund for maintaining respondents' farm in his study area and that these farmers do not have access or use bank loan due to lack of collateral and risky nature of agricultural productions.

Table 4 shows the percentage distribution of the Shea nut processors by membership of voluntary organization. The data reveals that majority (79.8%) claimed to be members of voluntary organization, while few (20.2%) claimed not to be members of organization. In the case of beneficiaries, majority (86.5%) claimed to be members of organization, while few (13.4%) did not belong to any social or processing organization. In the case of non-beneficiaries, majority (73.1%) claimed to be members of organizations, while few (26.9%) did not belong to any organization.

Table 4 shows the percentage distribution of the Shea nut processors by extension contact. The data indicates shows that more than half of the respondents (57.3%) had monthly extension contact while 46.3% had quarterly extension contact and22.4% had yearly extension contact on improved GIZ shea nut processing technologies. In the case of GIZ beneficiaries, majority (67.3%) of the respondents had monthly extension contact while minority (7.5%) had yearly extension contact and about one quarter of the respondents (25.2%) had quarterly extension contact. In the case of non-beneficiaries, 37.5% of the respondents had yearly extension contact, while27.4% had quarterly extension contact and 35.3% had monthly extension contact. This implies that the GIZ beneficiaries had more frequent extension contact than non-beneficiaries. This could be adduced to the fact that the GIZ beneficiaries were more committed to the special extension services of their technologies to the processors with a view to boosting their capacity rather than a general extension services from ADPs to all farmers. The results agrees with that of Asfaw *et al.,* (2012) that extension contact and mass media exposure for target programme or technologies used to be higher than a mere general extension approach to varying degree of farmers. In his findings, he found extension contact to have a positive and significant relationship with the adoption of a package of practices on mustard cultivation.

Table 4 shows the percentage distribution of the Shea nut processors by type of association. The reveals that majority of the respondents (65.2%) were members of farmers/processors cooperative, while few (3.0%) were members of social groups and 34.5% were not members of association. In the case of GIZ beneficiaries, majority of the respondents (96.3%) were members of farmers/processors cooperative, while very few (0.7%) were members of

social groups and few (3.0%) were not members of any association. In the case of GIZ non-beneficiaries, majority (66%) were not members of any association while few (34.0%) were members of farmers/processors cooperative unions. The finding implies that majority of the GIZ beneficiaries were membership of association particularly farmers/processors cooperative unions while majority of the non-beneficiaries were not members of associations. The result is in line with that of Yahaya *et al.* (2001) who found that majority of respondents participated in farmers' cooperative considering the advantages involved to be members in terms of availability and subsidized rate of inputs, access to credit facilities and extension services among others

Table 5: Distribution of Respondents by Average Monthly Income, Secondary Occupation and Distance to Processing Centers

Average Monthly Income	Beneficiaries		Non-Beneficiaries		Pooled	
	Freq (N=297)	%	Freq (N=297)	%	Freq (N=59)	%
From Shea Nut Processing						
1000 – 15000	57	19.2	110	37.1	167	28.1
15001 – 25000	93	31.3	137	46.1	230	38.7
25001 – 35000	68	22.9	31	10.4	99	16.7
35001 – 45000	34	11.4	7	2.4	41	6.9
45001 – 55000	28	9.4	9	3.0	37	6.2
55001 - 65000	10	3.4	1	0.3	11	1.9
above 65000	7	2.4	2	0.7	9	1.5
Total	297	100.0	297	100.0	594	100.0
Mean	29,000.00		20,102.36		24,285.8586	
Secondary occupation						
Trading	150	50.5	139	46.8	289	48.7
Farming	139	46.8	91	30.6	230	38.7
Artisan	8	2.7	67	22.6	75	12.6
Total	297	100.0	297	100.0	594	100.0
Mean	12047.1973		10107.7441		11075.8853	
Distance to Processing Centres (M)						
1 – 100	233	78.5	284	95.6	517	87.0
101 - 200	27	9.1	1	0.3	28	4.7
201 – 300	24	8.1	4	1.4	28	4.7
301 – 400	7	2.3	5	1.7	12	2.0
Above 400	6	2.0	3	1.0	9	1.6
Total	297	100.0	297	100.0	594	100.0
Mean	36.3360		15.7222		32.5396	

Source: Field Survey, 2018

Table 5 shows the percentage distribution of the Shea nut processors by average monthly income from Shea nut processing. The data reveals that the average monthly income to be N24, 285.86. On the aggregate, 28.1% earned monthly income less than or equal to N15,000.00, while 38.7% earned average monthly income of about N25, 000.00 from Shea nut processing activities and majority of the respondents (66.8%) had average monthly income of N25,000.00 and above from shea nut processing activities. For the GIZ beneficiaries, the mean of their average monthly income was N28, 469.36. About 19.2% earned monthly income less or equal to N15,000.00 while 31.3% earned average monthly income of about N25, 000.00 from Shea nut processing activities and majority of the respondents (49.5%) had average monthly income of N25,000.00 and above from shea nut processing activities. However, for the non-beneficiaries, the average monthly income was N20, 102.36. About, 37.0% of the respondents earned monthly income less or equal to N15,000.00, while 46.1% earned average monthly income of about N25, 000.00 and few (16.8%) had average monthly income of N25,000.00 and above from shea nut processing activities. The finding implies that the GIZ beneficiaries earned more with a mean of about N29, 000.00 than non-beneficiaries with a mean of N20, 102.36. The result is consistent with that of Asfaw,*et al.* (2014) who reported that beneficiaries of improved technology had net returns in their farming business, all things being equal, than others who did not benefit from improved package.

Table 5 shows the percentage distribution of the Shea nut processors by secondary occupation.. The data indicates that respondents engaged in secondary occupations ranging from trading, farming, and artisans with proportion of 48.7%, 38.7% and 12.7% respectively. The GIZ beneficiaries also had secondary occupations comprising trading, farming and artisan at 50.3%, 46.8% and 2.7% respectively. Also, in the case of non-beneficiaries, the processors had varying secondary occupations such as trading, farming and artisans with proportions of 46.8%, 30.6% and 22.5% respectively. The finding implies that majority of the respondents participated in secondary occupations namely trading, farming and artisans. This means that to cushion the problem at lean period of shea nut processing activities, processors were engaging in other income earning activities with a view to boosting their financial position to acquire new inputs.

Table 5shows the percentage distribution of the Shea nut processors by distance of processing centres to residential houses. The data reveals thatmajority of the respondents (87.0 %) trekked less than 100 metres to their processing centres from their residential houses, while very few of the respondents (1.5%) covered above 400 metres to the processingcentres. In the case of GIZ beneficiaries,majority (85%) trekked less than 100 metres to their processing centreswhile only few (2.0%) trekked above 400 metres to the processing centre.However, in the case of non-beneficiaries of GIZ, majority of the respondents (95.6 %) trekked less than 100 metres to the processing centres, while very few (1.0 %) trekked more than 400 metres to the Shea nut processing cenres. This implies that majority of the respondents lived very close to their processing centres and might not be spending muchtime and money to reach their processing centres.

Table 6: Distribution of Respondents by Degree of Cosmopolite-ness and Own Processing Centers

Degree of Cosmopolite-ness	Beneficiaries		Non-Beneficiaries		Pooled	
	Frequency (N=297)	Percentage	Frequency (N=297)	Percentage	Frequency (N=297)	Percentage
Always	160	53.9	124	41.8	284	47.8
Seldom	58	19.5	82	27.6	140	23.6
Never	79	26.6	91	30.6	170	28.6
Total	297	100.0	297	100.0	594	100.0
Own processing Centres						
Yes	88	29.6	77	25.9	183	30.8
No	209	70.4	220	74.1	411	69.2
Total	297	100.0	297	100.0	594	100.0

Source: Field Survey, 2018

Table 6 shows the percentage distribution of the Shea nut processors by degree of cosmopolite-ness. The data in the table reveals that 47.8 % of the respondents always travelled out of their area to source for information on improved processing technologies of Shea nut while 23.6% claimed they seldom travelledand 28.6% claimed that they never travelled out of their areas for information on improved processing technologies of Shea nut. In the case of beneficiaries of the GIZ intervention, more than half of the respondents (53.9 %) always travelled out of their areas, minority (19.5%) often travelled out of their areas and 26.6% never travelled out of their areas for information on improved processing technologies of Shea nut. However, in the case of non-beneficiaries of GIZ intervention, less than average of the respondents (41.8%) always travelled out of their areas, 27.6% often travelled out of their areas and 30.6% never travelled out of their areas to source for information on improved processing technologies of Shea nut. The finding implies on the general note that processors in the study area travelled out of their areas to source for more information on their processing activities and that the beneficiaries of the GIZ intervention travelled more to get abreast of any vital information on Shea nut processing technologies and its value additions to attract more income for improving their livelihood status in the communities than non-beneficiaries.

Table 6 shows the percentage distribution of the Shea nut processors by ownership of Shea nut processing centres. The data indicates that majority of the respondents (69.2 %) did not own their Shea nut personal processing centres, while only few (30.8 %) of the respondents claimed they owned their Shea nut processing centres. In the case of beneficiaries of the GIZ intervention, majority (70.4 %) of the respondents did not own their processing centres, while few (29.6 %) owned their Shea nut processing centres. Similarly, in the case of non-beneficiaries, majority (74.1 %) of the respondents did not own their processing centres, while minority (25.9 %) owned their Shea nut processing centres. This therefore implies that majority of the processors did not own their processing centres, indicating that the processors share processing centres to carry out collective activities.

Table 7: Distribution of Respondents by Sources of Information

Sources of Information	Beneficiaries		Non-Beneficiaries		Pooled	
	Frequency (N=297)	Percentage	Frequency (N=297)	Percentage	Frequency (N=297)	Percentage
Radio						
Yes	213	71.7	178	59.9	391	65.8
No	84	28.3	119	40.1	203	34.2
Total	297	100.0	297	100.0	594	100.0
Television						
Yes	147	49.5	153	51.5	300	50.5
No	150	50.5	144	48.5	294	49.5
Total	297	100.0	297	100.0	594	100.0
Agric. Show						
Yes	184	62.0	141	47.5	325	54.7
No	113	38.0	156	52.5	269	45.3
Total	297	100.0	297	100.0	594	100.0
Family/Friends/Neighbors						
Yes	277	93.3	254	85.5	531	89.4
No	20	6.7	43	14.5	63	10.6
Total	297	100.0	297	100.0	594	100.0
Ext. Agents (GIZ, ADP & other NGOs)						
Yes	294	99.0	50	16.8	541	91.1
No	3	1.0	247	83.2	53	8.9
Total	297	100.0	297	100.0	594	100.0
Processors Groups						
Yes	266	89.6	235	79.1	501	84.3
No	31	10.4	62	20.9	93	15.7
Total	297	100.0	297	100.0	594	100.0

Source: Field Survey, 2018

Table 7 shows the percentage distribution of the Shea nut processors by source of information on Shea nut processing technologies. The data reveals that majority of the respondents (91.1%) sourced their information from extension agents of GIZ, ADP and other NGOs, for the GIZ beneficiaries, majority (99.0%) sourced information from their GIZ extension agents whereas very few of the respondents (16.8%) who were non-beneficiaries of GIZ sourced information from extension agents of ADP which of course may be on seldom basis. Next to this were family/friends and neighbours (89.4%), processors groups (84.3%), radio (65.8%) and the least being agricultural show and television with proportions of 54.7% and 50.5% respectively. The pattern of order of sources of information is similar for both GIZ beneficiaries and non-beneficiaries where extension agents, family/friends and neighbours, processors group and radio were the major sources of their information. This implies that the respondents relied on the cheaper and face to face sources of information because of their financial capabilities. Also, it is cheaper to use a radio and have sufficient time to listen to agricultural programmes even during processing activities without waiting for epileptic electricity supply and its payment bills that are on the high side. Equally, the processors can communicate freely and fluently with the extension agents in their local languages.

Table 8: Distribution of Respondents by the Factors Constraining Adoption of Shea Nut Processing

Constraints to GIZ adoption	%	Mean	Std. Deviation	Rank
1.Inadequate finance	100.00	1.875	0.727	1
2. Poor market linkages/channels	92.30	1.737	0.711	2
3.Inability to understand due to illiteracy	84.60	1.630	0.705	3
4.Lack of credit facilities	76.90	1.576	0.689	4
5.Inadequate extension agents	69.20	1.542	0.512	5
6.Poor processors groups for annexing opportunities	61.50	1.451	0.687	6
7.Inadequate capacity building and follow-up	63.08	1.389	0.632	7
8.Less cooperation from the husband /families	46.10	1.387	0.626	8
9.Natural calamities (heavy rain storms	38.40	1.380	0.534	9
10.Religious values	15.30	1.22	0.424	10
11.Social insecurity	15.30	1.22	0.424	10

Source: Field Survey, 2018

3.2 Factors Constraining Adoption of Shea Nut Processing

Table 8 shows the percentage distribution of the Shea nut processors by factors constraining adoption of Shea nut processing. The data reveals the array of constraints to adoption of GIZ technologies by the respondents. The most severe of these constraints were inadequate finance ($\bar{x}$=1.875), poor market linkage/channel ($\bar{x}$=1.737) and inability to understand due to illiteracy ($\bar{x}$=1.630) as conceived by majority of the respondents in proportion of 100.0%, 92.3% and 84.6% respectively. Others found to be severe were credit facilities ($\bar{x}$=1.576), inadequate extension agents to go round the populace of respondents regularly ($\bar{x}$=1.542), poor processors' groups for annexing opportunities ($\bar{x}$=1.451) and inadequate capacity building ($\bar{x}$=1.576) and follow up ($\bar{x}$=1.387). However, the less severe constraints conceived by few of the respondents were (46.1%) for less cooperation from husband/families ($\bar{x}$= 1.387), 38.4% for natural calamities such as heavy rain storms ($\bar{x}$=1.380), 15.3% for religious values (1.22) and 15.3% for social insecurity ($\bar{x}$=1.22).

Hypotheses Testing

Three hypotheses were tested for the study

$HO_{1:}$ There is no significant relationship between some selected socio-economic characteristics of respondents and their level of adoption of GIZ shea nut processing technologies

Relationship between Socio-economic characteristics and the level of adoption

Table 9: Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.721[a]	.520	.498	.10368	.520	23.590	13	283	.000	.507

a. Predictors: (Constant), Degree of cosmopolitenes, Average monthly income, Age, Marrital status, Source of information, Education, Own processing centre, Cooperative membership, Household size, Contact with extension agent, Processing experience, Gender, Quantity of shea nut processing

b. Dependent Variable: Adoption Level.

Table 10: Result of ANOVA

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	3.296	13	.254	23.590	.000[b**]
	Residual	3.042	283	.011		
	Total	6.338	296			

a. Dependent Variable: Adoption Level

b. Predictors: (Constant), Degree of cosmopolite-ness, Average monthly income, Age, Marital status, Source of information, Education, Own processing centre, Cooperative membership, Household size, Contact with extension agent, Processing experience, Gender, Quantity of shea nut processing.

Table 11: Coefficients of Equation Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.834	.336		2.486	.013
	Age	.000	.001	-.012	-.225	.822NS
	Sex	-.138	.105	-.077	-1.309	.191NS
	Marital status	.001	.147	.001	.010	.992***
	Household size	.001	.002	.026	.551	.582NS
	Education	-.034	.009	-.168	-3.763	.000**
	Processing experience	-.003	.001	-.146	-2.960	.003*
	Own processing centre	.115	.015	.369	7.760	.000**
	Contact with extension agent	.108	.030	.176	3.626	.000**
	Quantity of shea nut processing	.000	.000	.140	2.326	.021*
	Average monthly income	1.639E-6	.000	.149	2.418	.016*
	Source of information	-139	.0106	-.079	-1.310	.194NS

	Cooperative membership	-.036	.012	-.131	-2.943	.004*
	Degree of cosmopolitenes	-.016	.008	-.099	-2.140	.033*

Source: Field Survey, 2018

a. Dependent Variable: Adoption; * at 5%, ** at 1%, *** at 10% and NS – non significant level of probabilities

b.

Relationship between Socio-economic characteristics and the level of adoption

The result in Table 11 shows that the estimated model explains about 52% of total variation occurring on the dependent variable. The model is good for prediction purposes and is relevant enough to the objective of examining the relationship that existed between the selected socio-economic characteristics and the adoption of GIZ technologies. Also, from Table 10, it is shown that the overall relationship between the dependent variable and the independent variables in the system of the equation were significantly positively correlated (F-Stat=23.59, P<0.000). Consequently, the null hypothesis is thereby rejected. This indicates that there is a significant relationship between some selected socio-economic characteristics and the level of adoption of GIZ technology.

Also, the Durbin Watson result 507 revealed high correlation and thereby indicates the presence of autocorrelation in the estimated residual values. Moreover, selected characteristics such as education, processing experience, own processing centre, contact with extension agents, quantity of shea nut processed, average monthly income, membership of cooperative societies and degree of cosmopolite-ness were significantly related with level of adoption, while age, sex, marital status, household sizes and source of information were not significant as indicated in Table 11, This result is consistent with Oladipo (2006); Oladipo(2009) who found a significant relationship between SES and selected personal characteristics. This is in line with that of Oladipo, *et al.* (2017) who reported a significant relationship between some selected socio-economic characteristics (age, processing experience and membership of association) and adoption of improved shea nut technologies.

Conclusion and Recommendation

From the findings, all the respondents were predominantly married women. Also, mean age, processing experience, quantity of Shea nut processed, average monthly income from Shea nut processing and secondary occupation of the beneficiaries were higher than that of the non-beneficiaries. This indicates that the beneficiaries took the advantage of the intervention to increase their productivity capacities to improve their livelihood activities in their communities.

The GIZ intervention in this study revealed that majority of the processors did not own their processing centres, indicating that the processors share processing centres to carry out collective activities. The strong Relationship i.e positive correlation between Socio-economic characteristics and the level of adoption of GIZ is a good indication for prediction purposes . The replication of the intervention to non-beneficiary communities to improve their skills on Shea nut processing technologies using GIZ's intervention with effective extension services is highly

recommended. The education and short-term processing technique for shea butter production is therefore, important and a concerted effort should be made by National Centre for Agricultural Mechanization (NCAM) to create awareness and organize training exercise under the auspices of National Shea butter Association of Nigeria (NASPAN) to extend the benefits of processing shea nuts to shea butter through GIZ intervention on improved shea nuts processing technique to the rural processors

The finding from this study showed that the shea industry provides economic opportunities in jobs, income, product output and market. Market access opportunities through trade helps ease entrance to the foreign confectionary and cosmetics industries whose demand is the current backbone of the shea industry resulting in the industry's growth

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