LEVEL OF UTILISATION OF MODERN PROCESSING TECHNOLOGIES AMONG SHEA BUTTER PROCESSORS IN KWARA STATE, NIGERIA

[1]Sanusi, M. K., [2]Tijani, S. A. and [2]Akinsokeji, O. A.
[1]Nigerian Institute For Oil-Palm Research (NIFOR), Date palm Sub-station, Dutse, Jigawa State
[2]Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan
Correspondent contact details: sanusimk2004@gmail.com; tsarafat@yahoo.com

ABSTRACT
The study examined the level of utilisation of modern processing technology among the Shea butter processors in Kwara State. Purposive sampling techniques was used to select Agricultural zones A and C as well as Kaima and Baruteen LGAs from Zone A while random sampling techniques was used to select Ilorin West and Moro L.G.As from Zone C. Thirty respondents were randomly selected from each of the selected LGAs to give a sample size of 120 respondents. .Interview schedule was used to collect the data which were analyzed with descriptive and inferential statistics. The results revealed that 88.3% of the respondents were female, 47.0% were between 40 and 50 years of age, married (86.6%), having low level of education (83.1%) and 1-10 years of experience (52.8%). The main source of information was the radio (96.6%). Level of awareness of modern processing technology was high (55.0%), with screw hydraulic (54.2%) being the most available technology while miller (54.3%) and roaster (53.3%) were the most utilised technologies. Generally, the level of utilisation of modern processing technology was low (53.8). The respondents identified lack of regular power supply (97.5%), lack of government support (75.7) and inadequate finance (72.9) as constraints. There was significant relationship between respondent's level of education (χ^2=25.65, p=0.01), level of production (r=0.772, p=0.028), years of experience (r=0.951, p=-0.009), constraints (r=0.724, p=-0.034) and their level of utilisation. Government should provide rural infrastructures such as stable source of electricity, credit facility and good road in the study area as well as training on how to use and maintain the equipment.
Keywords: Shea butter, utilisation, processors, modern technology and awareness

INTRODUCTION

The need for Nigeria to diversify her economy from crude oil driven economy to Agricultural products have been expressed at different conferences and fora because of the dwindling price of crude oil in the world market and the politics involved. The promotion of Shea butter industry in the country could be a viable option to exploit. Nigeria is abundantly blessed with Shea trees which could be harnessed for industrial development through which the quality of life of the people will be improved especially in providing employment to a large number of people in the Shea tree belt (Garba *et al.,* 2011). It can also be a source of foreign exchange earnings for the country.

Shea butter, a fatty extract from the seed of Shea tree is the most important product from the Shea tree and is known to contain a number of ingredients that moisturizes and heals skin aliments (Matanmi *et. al.*, 2011). Shea butter has many uses such as for cooking oil, in the making of chocolate and beverages, candle and as moisturizers in the cosmetic and pharmaceutical industry. It is used traditionally for the treatment of skin disorders like eczema, burns, rashes, stretch marks, acne, wrinkles, skin discolorations, itching and other skin problems.

Nigeria realising the potential of Shea butter to her economy has begun to acquire modern skills and advanced processing methods to increase the Gross Domestic Product (GDP) that accrues from the Shea butter to the nation. In order to improve and increase Shea butter production in term of quality and quantity as a long term solution to Shea butter industry in Nigeria, it requires the generation of output increasing and quality improving technologies through various research institutes in the country such as Nigerian Institute For Oil palm Research (NIFOR) and Raw Material Research and Development Council (RMRDC).

The transformation of Shea nuts into butter is a difficult task. The process involves intensive physical labour as well as considerable amount of water and firewood. The preparation process takes several days and involves many stages. The steps in the Nigeria traditional Shea butter processing are 14 (Daniel et. al 2005). For the aim and objective of increasing Shea butter production to be achieved, the available modern processing technologies must be disseminated, adopted and utilised by small holder processors who are the major producer of Shea butter in Nigeria.

There are a range of technologies that have been developed to address almost all the 14 stages of the traditional processing method. With the overall objective of eliminating drudgery involved in the local processing, improve the quality and quantity of Shea butter produced in the country. The equipment such as crusher, milling machine, hydraulic press and kneader has replaced the traditional method. The crushing process, traditionally done with mortar and pestle is replaced with a hammer mill, while milling which is done using grinding stone is replaced with a modified (corn) mill. Corn mill was adapted to grind crushed roasted Shea nuts into fine paste. Kneader has been fabricated to replace the

traditional manual hand and pedalling kneading process (Daniel et al 2005).

Despite the huge and wide usage of Shea butter and the availability of modern processing technologies which can be used to improve the production and make the work more attractive to whoever want to venture into Shea butter production as well as efforts of government and Non-government agencies to promote the adoption of these technologies, the traditional method being utilised by some processors makes Nigeria processed Shea butter to fall below international standard. Consequently, the demand is decreasing and the potentials of Shea butter in alleviating rural poverty is dwindling (Ademola *et al.,* 2012). It is on this premise that an assessment of the level of utilisation of modern processing technology among Shea butter processors in Kwara State was carried out.

The general objective of the study was the assessment of the level of utilisation of modern processing technologies among Shea butter processors in Kwara State while the specific objectives were to:

1. examine the enterprise characteristics of Shea butter processors in the study area,
2. ascertain the modern Shea butter processing technologies available in the study area
3 identify the sources of information on modern Shea butter processing technologies,
4. determine the level of awareness of processors on o modern Shea butter processing technologies, and
5. identify the constraints facing the processors in the use of the modern processing technologies

The hypotheses of the study, stated in null form, are as follows;

H_o1: There is no significant relationship between the personal characteristics of the respondents and their level of utilization of modern processing technologies.

H_o2: There is no significant relationship between the selected enterprise characteristics of the respondents and their level of utilization of modern processing technologies

METHODOLOGY

The study was carried out in Kwara state, Nigeria because Kwara State is one of the major producer of Shea butter in Nigeria, The state lies in the north central zone and covers an area of 74256 square km of the total area of Nigeria. Kwara state is bounded in the north by Niger state, in the south by Oyo, Osun and Ekiti state, in the east by Kogi state and in the west by Benin Republic. The state is divided into sixteen (16) local government areas. The population of the study comprised of all Shea butter processors in Kwara state, Nigeria.

Purposive sampling techniques were used to select Agricultural zones A and C because of the large number of Shea butter processors in these zones and selection of Kaiama and Baruteen Local government areas from Zone A while random sampling was used to select Ilorin West and Moro Local government areas. from Zone C and 30 respondents from the list of registered processors with the State ADP in each of the Local government areas selected from Zone A and C to give a sample size of one hundred and twenty (120) respondents. Data were collected by using an interview schedule which was administered to Shea butter processors in the study area.

The data were subjected to descriptive statistics such as frequencies and percentages and inferential statistics such as chi-square and Pearson Product Moment Correlation (PPMC). . Sources of information on modern processing technologies were measured by asking them to state their source of information and ranked based on their frequency, Level of awareness was obtained by asking the respondents to identify those that they know from the ten listed modern processing equipment. Score of 1 and 0 was assign to aware and unaware respectively. The mean value was used to categorize as high or low level of awareness. Availability of modern processing technologies was obtained with Yes = 1 and No = 0 on the list of 10 technologies available in the area and it was later ranked.

Constraints was measured with 13 likely constraints that can be encountered while using modern processing technologies on a three point scale of not constraint = 0, mild constraints =1 and severe constraints =2. The levels of utilisation was measured on a three point scale of never, sometimes and always with score of 0, 1 and 2 respectively. Mean was used to classify level of utilisation into high and low.

RESULTS AND DISCUSSION

The age distribution in Table 1 shows a mean value age of 47.5 years with 47.0% of the respondents between the age ranges of 40-49 years and 34.4% between the age ranges of 50-59 years. Most of the Shea butter processors are in their active age thus they would be energetic enough to perform the tedious activities involved in Shea butter processing. It was also observed that majority (88.3%) were females showing the dominance of women in the profession with the majority (86.6%) being married suggesting meeting of the household responsibility as the sole aim of engagement in Shea butter processing. Majority (72.6%) were Muslims with household size range of 5-8, implying high labour intensiveness of Shea butter processing

Respondents' educational status revealed that 31.4% of the respondents had primary education, 25.4% had adult education while 26.3% have no formal education. One cannot speak utilisation level without educational attainment of the individual as low level of educational attainment may affect level of awareness of modern processing technologies and utilisation at large.

Table 1: Personal Characteristics of Shea Butter Processors

Variables	Frequency	Percentage	Mean
Age			
20- 29	2	0.9	47.5
30- 39	25	11.2	
40- 49	55	47	
50- 59	30	34.4	
60 and above	5	6.5	
Sex			
Male	14	11.7	
Female	106	88.3	
Marital status			
Single	3	2.5	
Married	103	86.6	
Divorced	3	2.5	
Widowed	4	3.4	
Widower	3	2.5	
Separated	3	2.5	
Religion			
Christianity	29	24.8	
Islam	85	72.6	
Traditional	3	2.6	
House hold size			
1-4	3	2.6	8
5-8	77	65.9	
9-12	34	29.2	
13-16	3	2.6	
Level of education			
No formal education	31	26.3	
Primary	37	31.4	
Secondary	13	11.0	
Adult	30	25.4	
Tertiary	7	5.9	

Table 2 revealed that majority (66.2%) of the respondents use calabash as a measurement for Shea butter processed and 58.4% produced 11-20 calabashes per week with a few (1.7%) producing 31- 40 implying that most of the respondents are operating at low scale.

The selling price varies with a larger proportion of respondents (49.1%) selling between ₦1000- ₦1500 per calabash, 41.6% sell between ₦2100- ₦2500 while only 0.8% sells between ₦2600- ₦3000 at the exchange rate of ₦160 per $1US dollar. The variation in prices could be due to the cost of input used in the production. Table 2 also revealed that 48.7% of the respondents used hired labour for Shea butter processing, 39.5% make use of their family while 11.8% used both hired and family labour. It implies that Shea butter processing is labour intensive thus processors will require additional labour in order to carry out the processing.

Majority (52.8%) of the respondents had between 1 and10 years of experience in Shea butter processing activities while 3.8% of them had between 31 and 40 years of experience. This implies that the processors were still young in the activities thus will need additional training to improve on the activity. Majority of the respondents (66.8%) market their product at retail and 33.3% market their product at wholesale which can be as a result of low production.

Table 2: Distribution of Respondents Based on Enterprise Characteristics

Variables	Frequency	Percentage
Scale of measurement		
Calabash	80	66.7
Kilogram	40	33.3
Number Of Calabashes Per Week		
1-10	31	25.8
11-20	77	58.4
21-30	17	14.1
31-40	2	1.7
Amount per calabash (₦)		
1000 - 1500	59	49.1
1600 - 2000	8	6.6
2100- 2500	50	41.6
2600- 3000	1	0.8
3100- 3500	2	1.7
Sources of labour		
Family labour	47	39.5
Hired labour	58	48.7
Both	14	11.8
Years of experience		
1-10	28	52.8
11-20	17	32.2
21-30	6	11.2
31-40	2	3.8
Marketing channel		
Retail	75	65.8
Wholesale	38	33.3
Both	1	0.9

Sources of information on modern Shea butter processing technology

The result on Table 3 revealed that majority (96.6%) of the respondents obtained information from radio, 92.4% from television, 80.8% from Neighbours, 74.2% from Cooperatives and a least number of the respondents (57.5%) obtained information from the extension agents. This could be attributed to the low level of literate among the respondents as most of them had primary education, coupled with lack of electricity in most of the rural areas resulting in the use of radio that can be powered through external battery. This study revealed that only few extension agents have been reaching the Shea butter processors which could be attributed to bad roads and the long distance in getting to the study area.

Table 3: Sources of information on modern shea butter processing technology

Sources of information*	Frequency	Percentage	Ranking
Radio	114	96.6	1st
Television	109	92.4	2nd
News paper	91	77.1	4rd
Extension agent	69	57.5	8th
Association	92	76.7	5th
Cooperatives	89	74.2	6th
Friends and family	87	72.5	7th
Neighbours	97	80.8	3rd

*Multiple responses

Awareness of modern processing technology

Table 4 shows that the respondents generally had a high level of awareness of modern processing technology to the extent that 98.3% of them were aware of the pre-cleaner, storage tank (94.2%) and milling machine (84.2%) while the least awareness was on heated holding tank (64.2%). The categorisation of the respondents on their level of awareness of modern processing technology reveals that 55.0% of the processors were aware of the modern processing technologies through various sources which can be improved upon through sensitisation of the processors on the benefit of using the technologies

Table 4: Distribution of respondents based on awareness on modern processing technology

Modern processing technologies	Aware		Mean
	Frequency	Percentage	
Pre-cleaner	118	98.3	0.98
Crusher	100	84.0	0.83
Screw hydraulic	81	67.5	0.68
Vibrating screen	89	74.2	0.74
Roaster	79	66.4	0.66
Expeller	82	68.3	0.68
Heated holding tank	77	64.2	0.64
Storage tank	113	94.2	0.94
Milling machine	101	84.2	0.84
Kneader	83	69.2	0.69
Overall mean	7.69 (range =1-10) SD 3.04		

*Multiple responses

Availability of modern processing technologies

Table 5 shows that screw hydraulic ranked 1st (54.2%) indicating that majority of them possess screw hydraulic technology because of its importance in the processing of Shea butter. Meanwhile, there was low availability of storage tank (36.7), pre-cleaner (41.7) and kneader (42.5). In general there was low availability of the modern processing technologies which could be as a resulted of the fact that the machineries required for processing are too expensive for them to afford.

Table 5: Availability of the modern processing technologies

Modern processing technologies	Available		Rank
	F	%	
Pre-cleaner	50	41.7	9th
Crusher	62	47.9	2nd
Screw hydraulic	65	54.2	1st
Vibrating screen	51	42.5	7th
Roaster	53	44.2	6th
Expeller	56	46.7	3rd
Heated holding tank	55	45.8	4th
Storage tank	44	36.7	10th
Milling machine	55	45.3	5th
Kneader	51	42.5	7th

**Multiple responses

Constraints faced by respondents in using modern processing technologies

Result in Table 6 revealed that 80.7% of the respondents identified lack of regular power supply as severe constraint thus ranked 1st, followed by lack of government support (48.8%) which ranked 2nd and inadequate fund (ranked 3rd) to provide alternative power supply. Most of the modern processing equipment are no longer functioning and it is too expensive to repair or replace them by the processors as respondents also lack access to credit facilities.

Mild constraints identified by the respondents were scarcity of Shea nuts (79.8%) that ranked 7th and lack of storage facility (78.2%) that ranked 8th. This is expected as Shea butter is still gotten from the wild and there are no storage facilities to store the nut at the peak period. Effort should be made to sensitized farmers to plant Shea trees because of enormous uses of Shea butter and the processors should be trained on how to store the Shea nuts for long period. Inadequate transport facility (62.7%) was also seen as a mild constraint by the respondents. This was corroborated by the finding of Lovette (2011) which affirmed that transportation issue is widespread with high cost and limited reliable, poor roads and corrupt customs procedures in existence for anyone wanting to move Shea kernel or butter between countries or out of continent.

Table 6: Constraints to use modern processing technology

Constraints	Severe constraint	Mild constraint	Not constraints	Mean	Rank
Scarcity of Shea nuts	4.2	79.8	16.0	0.88	7th
Lack of storage facility	4.2	78.2	17.6	0.86	8th
Complexity of modern techniques	3.4	72.3	24.4	0.78	9th
Tedious processing	7.6	57.6	34.7	0.72	12th
Insufficient good quality water	11.9	55.1	33.1	0.78	9th
Inadequate transport facility	6.8	62.7	30.5	0.75	11th
Scarcity of labour to help in processing activities	6.8	48.7	40.3	0.70	13th
Inadequate finance	25.4	47.5	27.1	0.97	3rd
Unstable price of commodity	13.4	64.7	21.8	0.91	6th
High cost of processing equipment	22.7	49.6	27.7	0.94	4th
Lack of credit facilities	25.4	44.9	29.7	0.94	4th
Government aid is not adequate	40.7	35.0	23.7	1.15	2nd
Lack of regular power supply	80.7	16.8	2.5	1.77	1st

Level of utilisation of modern processing technologies

Table 7 shows that milling machine technology (47.9%) was mostly used and ranked 1st by the respondents relative to other technologies. This may be because it is the most common modern technology in the area and probably the technology is the cheapest. Other technologies used in the study area are roaster (50% always), storage tank (47.5% always) and kneader (42.4% always) ranked 2nd, 3rd and 4th respectively. In contrast, the respondents use expeller technology always (18.3%), occasional (5.8%) and never (75.8%) recording most unused modern shea butter processing technology, probably due to high price and unavailability in the study area.

With regards to level of utilisation of the modern processing technologies, the study revealed that most (53.8%) of the respondents do not use the modern processing technology. This could be due to the fact that they lack finance to purchase the machineries and the modern processing technology they have are not functioning well due to lack of maintenance and repair or because they lack the technical skill on how to operate these machineries.

Table 7: Level of utilisation of Modern Processing Technologies

Modern processing technologies	Always	Occasional	Never	Mean	SD	Rank
Pre-cleaner	40.0	5.0	55.0	0.85	0.97	7th
Crusher	36.7	9.2	54.2	0.83	0.94	8th
Screw hydraulic	40.0	8.3	51.7	0.88	0.95	6th
Vibrating screen	42.0	6.7	51.3	0.91	0.97	5th
Roaster	50.0	3.3	53.3	1.03	0.99	2nd
Expeller	18.3	5.8	75.8	0.43	0.79	10th
Heated holding tank	37.8	5.0	57.1	0.81	0.96	9th
Storage tank	47.5	5.8	53.3	1.01	0.94	3rd
Milling machine	47.9	9.4	57.3	1.05	0.96	1st
Kneader	42.4	11.9	54.2	0.97	0.94	4th
Mean of overall utilisation	8.73 (range=0 -20) SD 5.20					

**Multiple responses

Table 8 shows a positive correlation between level of education and utilisation of modern technology. This can be attributed to the fact that education can help the respondent to have a good perception about the technologies hence their utilisation

Table 8: Chi square analysis of relationship between respondents' level of education and level of technology utilisation

Variables	χ^2 value	df	p-value	Decision
Educational level Level of technology utilisation	25.65	8	0.01	Significant

Table 9 shows a positive correlation of level of production and level of technology utilisation. This can be explained by the fact that high production level can only be achieved with high modern processing technologies utilisation. However a negative correlation existed between respondents' years of experience and level of technology utilisation. That is the higher the

respondents' years of experience the lower the level of technologies utilisation. This could suggest that they have mastered the trade that they do not need the modern technologies or it is difficult to change their old ways of producing Shea butter or due to lack of the capacity or education to operate it.

The constraints associated with the use of modern processing technologies have a negative relationship with the level of utilisation. The higher the constraints to use the modern processing technologies the lower the level of utilisation of the technologies. Efforts should be made to reduce the constraints identified in the study area in order to enhance the level of utilisation of modern technologies.

Table 9: Pearson Product Moment Correlation analysis of the study

Level of utilisation of modern processing technologies	r-value	p-value
Level of production	0.772	0.028*
Years of experience	0.951	-0.009*
Constraints	0.724	-0.034*

CONCLUSION AND RECOMMENDATIONS

The level of utilisation was low because majority of the respondents did not use modern processing technologies despite their high level of awareness sighting no power, lack of government support and inadequate finance to purchase and maintain existing ones as constraints. It is recommended that

Government should provide rural infrastructures such as electricity, credits, water and road in the study area to enhance the use of these technologies., Enlightenment programme should also be embarked upon to sensitize the processors on the benefit and training on how to use and maintain the equipment in the local language because of their low level of education,

REFERENCES

Ademola, A. O., Oyesola, O. B. and Osewa, S. O. (2012). Assessment of Shea butter processing among rural dwellers in Atisbo Local Government Area of Oyo state, Nigeria. *European Journal of Business and Social Sciences* Vol. 1. No. 6: Pp. 1-8

Alander, J. (2004). Shea butter – a multifunctional ingredient for food and cosmetics. *Lipid Technology*, 16(9): 202–205

Carette, C., Malotaux, M., van Leeuwen, M., Tolkamp, M. (2009). Sheanut and Butter in Ghana: Opportunities and Constraints for Local Processing. University of Wageningen: Wageningen. The Netherlands. Pp. 6-8

Daniel, A. O., Olafimihan, E. Kwaya and O. Odejide.2005.Shea nut processing: Raw Material update. *A Bi-annual publication of Raw Materials Research and Development Council* Vol. 5. No.2

Garba, I. D., Nwawe, C N., Osiakede I. L. (2011). The Potential Of Shea Nut Tree To The Nigerian Economy. *International Journal Of Agricultural Economics And Rural Development*. Pp. 62–72. Retrieved august 28, 2011, from URL http://www.ijaerd.latechaeee-edu.com

Matanmi B. M., Adesiji, G. B. Olasheinde, E. M. and Oladipo, F. O. (2011). Assessment of usage of upgraded indigenous Shea butter processing technology by women processors in Kwara State, Nigeria. *Agrosearch.* Vol.11. No. 1&2: Pp. 19 – 30 http://dx.doi.org/10.4314/agrosh.v11i1.3