Journal of Agriculture and Sustainability
ISSN 2201-4357
Volume 12, Number 2, 2019, 202-218

INFINITY PRESS
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Effect of Manual Screw Press Utilization on Output, Income, and Standard of Living of Gari Processors in Kwara State, Nigeria

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Abstract

The study assessed the effect of utilization of manual screw press for gari production on output, income, and standard of living of gari processors in four local government areas across the ADP zones in Kwara state, Nigeria. Using multistage sampling technique and a semi-structured questionnaire as instrument, data for the study were collected from a sample of three hundred and eighty four (384) gari processors who use the screw press in the state. Descriptive statistics namely frequency count, percentages and mean was used for analysis of generated field data. The study revealed a 35.5 percent increase in gari production was achieved with utilization of the screw press for gari production. Also, average annual income from gari processing after utilization went from ₦809662 to ₦1249375; 35.19 percent increase. Furthermore, average household properties owned by processors went from 2.31 before utilization to 3.24 after utilization which is an increase of 28.7 percent. The study concluded that utilization of manual screw press by gari producers in Kwara state has lead to increased output, a higher income, and a better standard of living for gari producers. These increases would most probably lead to increase in their probability of escaping poverty, and in the long run would lead to sustainable food security for the country.

Key words: Income, Manual screw press, Output, Standard of living, Utilization

1. Introduction

Postharvest technologies are technologies that are applied to agricultural commodities after harvest for the purpose of preservation, conservation, enhancement, processing, packaging, storage, distribution, marketing, and utilization to meet the food and nutritional requirements of consumers in relation to their needs (Indian Council of Agricultural Research (ICAR), 2016). They are important parts of any agricultural system and are vital in all circumstances, whether there is surplus or deficit (Vilane, Shongwe, Motsa, & Shongwe, 2012).

The significance of improved technologies to agricultural development especially in developing countries cannot be over emphasized; this is predicated on the impact of improved technologies and it potentials, and actual contributions to the development of agriculture. For example, improved postharvest technologies have enhanced food security, revolutionized how farmers run their business, and have changed the face of rural communities (Obayelu, 2014). Again, improved postharvest technologies stimulate agricultural production by preventing postharvest losses, adds value to agricultural products, open new marketing opportunities, and create jobs (Verma and Joshi, 2000).

Furthermore, improved postharvest technologies are among the primary factors contributing to increases in postharvest productivity in developing countries, they can provide additional rural employment, and food prices are demonstrably lower because of their utilization (Tripp, 2005). They can affect smallholder income, labour opportunities for the poor, food prices, environmental sustainability, and linkages with the rest of the rural economy (Bourne, 2004). Utilizing improved postharvest technologies often results in reduced food losses, improved overall quality and food safety, and a higher profits for growers and processors of crops (Tashi, 2015).

Nigeria is known to be the leading producer of cassava in the world with an annual output of 52 million tonnes of tuberous roots (FAO, 2011). Also, about two thirds of total cassava production in Africa takes place in Nigeria (Sanni, Onadipe, Ilona, Mussagy,

Abass, & Dixon, 2009). Cassava has the potential to increase farm incomes, close the food gap as well as reduce rural and urban poverty; the crop gained national prominence as a potential food security crop and foreign exchange earner for the nation following the pronouncement of a presidential initiative on cassava in 2002 (Adebayo, Fabusoro, & Fapojuwo, 2008).

Henry, Westby, & Collinson (1999), reported that numerous factors negatively affect cassava processing which limits the contribution that the crop makes to the nation economy. In particular, high moisture content in cassava roots is a major factor limiting its utilization (Sanni, 2005). In attempts to surmount the intrinsic challenges of traditional cassava processing, giant strides have been made to mechanizing several labour intensive operations, notably dehydrating. Consequently, the technology of interest for this study is the manual screw press for cassava mash dehydration for gari production.

The manual screw press is a device for applying pressure by turning of a thread shaft (Baldwin & Marvin, 2017). It works by using a screw to convert the rotation of the handle or drive into a downward movement of greater force. According to United Nations Industrial Development Organization (UNIDO) (1989) the produced pressure of a typical screw press could reduce the water content of cassava mash to about 45-50%; often attained after 10-40 minutes. The manual screw press is basically composed of a press screw, a press lever, metallic supports, and a compressor disk. The dehydrating operation consist of putting cassava mash in polyethylene bag(s) into the press, and turning of the thread shaft, in the process the excess water from the cassava mash is extracted and removed by draining.

The main objective of this study is to investigate the effect of manual screw press for dehydrating cassava mash for gari production on output, income, and standard of living of gari producers in Kwara state, Nigeria.

2. Material and Methods

The study was conducted in Kwara State, Nigeria, located between Latitude 8^0 05′ and 10^0 05′ North and Longitude 2^0 50′ and 6^0 05′ East of Greenwich Meridian (Oyebanji, 2000). According to National Bureau of Statistics (2012) Kwara state has a land mass of 35,705 square kilometres (km^2). The 2006 population census by the National Population Commission put the population of the state at 2,371,089 (Federal Government of Nigeria, 2007). This study is a cross-sectional survey. Multi-stage sampling technique was used to select respondents for the study. For this study, necessary sample size of 384 was calculated and adopted using the formula by Smith (2013) for determining necessary sample size when population is unknown or approximated.

One local government area (LGA) each from the four agricultural zones of the state namely Kaima, Edu, Asa, and Ifelodun was purposively selected to ensure that the study cuts across the ADP zones in the state. Simple random sampling technique was used to select three (3) wards each from local government areas selected earlier selected. Consequent on the fact that it is difficult, if not impossible to come up with sample frame for the study by the researcher or from secondary sources; because of the nature of the population itself, it was imperative that Gari processors who utilize the manual screw press who have been previously identified through the assistance of local resource persons from each ward was selected through a simple random sampling method. Primary data was collected by the researcher through interviews (individual interview). Descriptive statistics namely frequency count, percentages and mean was used for analysis of generated field data.

3. Results and Discussion

Effect of utilization of screw press on output

Table 1: EFFECT OF UTILIZATION OF SCREW PRESS ON OUTPUT

Quantity before use			Quantity after utilization			$\bar{x}_1$	$\bar{x}_2$
Quantity of Gari produced	**Frequency**	**Percentage (%)**	**Quantity of Gari produced**	**Frequency**	**Percentage (%)**		
1-19 BAGS	3	0.8	1 -19 BAGS	-	-		
20-39 BAGS	13	3.4	20-39 BAGS	-	-		
40-59 BAGS	65	16.9	40-59 BAGS	-	-		
60-79 BAGS	108	28.1	60-79 BAGS	5	1.3		
80-99 BAGS	102	26.5	80-99 BAGS	49	12.7		
100-119 BAGS	71	18.4	100-119 BAGS	82	21.3		
120-139 BAGS	22	5.7	120-139 BAGS	145	37.7		
MORE THAN 140 BAGS	-	-	MORE THAN 140 BAGS	103	26.8	**80.4**	**124.6**
Total	**384**	**100**	**Total**	**384**	**100**	**80.4**	**124.6**

Table 1 indicated that before utilization of the manual screw press 0.8% (3) of the respondents produced less than 20 bags of gari, 3.4% (13) produced between 20-39 bags, and 16.9% (65) produced between 40-59 bags of gari annually. Furthermore, 28.1% (108) of respondents produced between 60-79 bags of gari, 26.5% (102) produced between 80-99 bags, while 18.4% (71) produced between 100-119 bags of gari annually. Again, 5.7% (22) of the respondents produced between 120-139 bags, while none of the respondents produced gari that is over140 bags. The average gari production before respondents started utilizing the screw press is 80.44 bags.

After utilization, none of the processors produced less than 60 bags of gari annually. 1.3% (5) produced between 60-79 bags, while 12.7% (49) produced 80-99 bags. Furthermore, 21.3% (82), 37.7% (145), and 26.8% (103) of the respondents produced 100-119 bags, 120-139 bags, and more than 140 bags respectively. The average output went from 80.44 bags before utilization to 124 bags after utilization; 35.5 percent increase. This implies that there was increase in output for the producers when they utilized the screw press. This finding affirms that improved postharvest technologies have the potential to increase output/productivity.

Those in agriculture and concomitant enterprises are not likely to use an innovation if outputs are not increased from given resources, and/or if inputs are not decreased for a given output. The use of improved agricultural technologies affects the rate of increase in agricultural output, and increased output in the long run impacts on poverty levels (Meinzen-Dick, Adato, Haddad, and Hazell, 2004). Our study agreed with findings of Kijima *et al* (2008) who reported an increase in yield that is almost twice as large as average yield of traditional rice in sub-Saharan Africa when farmers use the improved rice variety NERICA in Uganda.

Our finding is also in sync with that of Obisesan, Taiwo, and Akinlade (2016), who found that utilization of improved technology increased cassava yield of farmers by 4.68 tonnes/ha in south-western Nigeria. Similarly, our finding is akin to that of Kinuthia & Mbaya (2017) study on determinant of technology utilization and how it affects farmers' standard of living in Tanzania and Uganda; their finding shows that farmers who plant improved varieties get more yield that those who do not. This study also corroborate the finding of Agbarevo and Okeke (2015) in Abia state, Nigeria that utilization of improved cassava processing technologies lead to increase in output of various cassava products.

Effect of utilization of screw press on Income

Table 2: Effect of utilization of screw press on income

Income before utilization			Income after utilization			$\bar{x}_1$	$\bar{x}_2$
Income	**Frequency**	**Percentage (%)**	**Income**	**Frequency**	**Percentage (%)**		
LESS THAN N200000	3	0.8	LESS THAN N200000	-	-		
N200000-N399000	13	3.4	N200000-N399000	-	-		
N400000-N599000	64	16.6	N400000-N599000	1	0.3		
N600000-799000	108	28.1	N600000-N799000	5	1.3	**₦809662**	**₦1249375**
N800000-N999000	103	26.8	N800000-N999000	48	12.5		
1000000-1199000	71	18.4	N1000000-N1199000	82	21.3		
N1200000-N1390000	22	5.7	N1200000-N1390000	144	37.4		

Table 2 shows that before utilizing the screw press 0.8% (3) of our respondents made less than ₦200000 as income from gari processing annually. Furthermore, 3.4% (13) made between ₦200000-₦399000, 16.6% (64) made ₦400000-₦599000, while 28.1 percent made between ₦600000-₦799000. Furthermore, 26.8% (103), 18.4% (71), and 5.7% (22) made between ₦800000- ₦999000, ₦1000000- ₦1199000, and ₦1200000- ₦1390000 respectively. However, none of the respondents made income above ₦1400000. The average annual income before utilization was ₦809662.

Nevertheless, after utilization none of the processors made less than ₦400000 income from gari processing annually. 0.3% (1), 1.3% (5), 12.5% (48), 21.3% (82) and 37.4% (144) of our respondents made between ₦400000- ₦599000, ₦600000-₦799000, ₦800000-₦999000, ₦1000000- ₦1199000, and ₦1200000- ₦1390000 respectively. Also, 27.0 percent of the respondents made ₦1400000 and above. The average annual income from gari processing after utilization went from ₦809662 to ₦1249375; 35.19 percent increase. This implies that there was increase in income for the producers when they utilize the screw press. It also affirmed that improved postharvest technologies have the potential to increase income.

Our finding is in agreement with that of Kijima, Otsuka, & Sserunkuuma (2008) on impact of adoption of agricultural innovations on income in Uganda. Kijima et al. found that New Rice for Africa (NERICA) has the potential to increase per capita income by 20 USD (12% of actual per capita income) and to decrease the poverty incidence, measured by the head count ratio by 5 percentage points (from 54.3% to 49.1%). Also, poverty gap index and squared poverty gap index decline by the introduction of NERICA, suggesting that its income enhancement can be realized among the poorest of the poor in Uganda. Findings from the study conducted in Nigeria by Dontsop-Nguezet, Diagne, Okoruwa, and Ojehomon(2011) similarly indicated that adoption of NERICA increased total farm household income and per capita expenditures by ₦63,771 and ₦4,739 respectively.

Besley & Case (1993) maintained that adoption of improved crop varieties has long helped increase agricultural income in Developing countries. For example, Ibrahim, Florkowski, & Kolavalli (2012) purport that there is direct positive effect of technology adoption on farmer's income resulting from higher yields and prices in Ghana. Also, in Uganda, Kassie, Shiferaw, & Muricho (2011) evaluated the impact of adoption of groundnuts varieties on crop income and poverty and found a positive and significant impact of crop production on crop income that is consistent with the perceived role of

new agricultural technologies in reducing rural poverty through increased farm household income.

Nevertheless, cassava processing using improved technologies does not always lead to considerable increase in income especially for small scale processors. For example, FAO (1995) in a cassava processing study conducted in 1994 concluded that the returns to small-scale production of gari are low, especially for those who buy roots, making it difficult to justify investment in and utilization of improved post harvest technologies.

Effect of utilization of screw press on standard of living

Table 3: Effect of Utilization of screw press on standard/level of living

Household properties before utilization				Household properties after utilization			
Household properties	Frequency	Percentage (%)	Mean	Household properties	Frequency	Percentage (%)	Mean
Radio	273	71.1		Radio	109	28.4	
Television	17	4.4		Television	189	49.2	
Generator	8	2.1		Generator	43	11.2	
Elect. fan	224	58.3		Elect. fan	133	34.6	
Bed	164	42.7	2.31	Bed	158	41.1	3.24
Cushion chair	39	10.2		Cushion chair	268	69.8	
Fridge	5	1.3		Fridge	161	41.9	
Kerosene stove	160	41.7		Kerosene stove	177	46.1	
Gas cooker	0	0		Gascooker	7	1.8	
Total	**890**				**1245**		

Households' endowment is usually used as a measure of standard/level of living of households (Awotide, Diagne, Awoyemi, and Ojehomon, 2012). Table 3 revealed that 71.1% (273), 4.4% (14), 2.1% (8), and 58.3% (224) of respondents had radio, television, generator, and electric fan respectively before utilizing the manual screw press for dehydrating cassava mash for production of gari. Also, 42.7% (164), 10.2% (39), 1.3% (5) and 41.7% (160) of the respondents had bed, cushion chair, fridge, and kerosene stove respectively before utilization of the manual screw press. However, none of the respondents had a gas cooker. The average number of household properties for respondents before they began utilizing the screw press is 2.31.

On the other hand 28.4% (109), 49.2% (189), 11.2 % (43), and 34.6% (133) of respondents had radio, television, generator, and electric fan respectively after they began utilizing the screw press. Also, 41.1% (158), 69.8% (268), 41.9% (161), 46.1% (177), and 1.8% (7) had bed, cushion chair, fridge, kerosene stone, and gas cooker respectively after utilization. The average properties owned by processors went from 2.31 before utilization to 3.24 after utilization which is an increase of 28.7 percent. This result indicates that households had more properties when they began utilizing the screw pres. It also suggests that utilization of improved postharvest technologies has improved the standard of living of users.

The finding is consistent with that of Adofu, Shaibu, and Yakubu (2011) who in their study found that utilization of improved cassava technologies led to improvement in the standard of living of cassava farmers in Kogi state Nigeria. It is also in agreement with the study of Afolami, Obayelu, & Vaughan (2015) on impact of adoption of improved cassava varieties in south western Nigeria; their study revealed that adopters had a better welfare than non-adopters. In other words, utilization of improved agricultural technologies has the potential of increasing standard of living of a people.

Kinuthia & Mbaya (2017) study on determinant of technology utilization and how it affects farmers' standard of living in Tanzania and Uganda show the utilization of

improved seeds varieties help households especially in rural areas improve their standard of living. Bercerril & Abdulahi (2010) maintain that improved agricultural technologies are the most important factor in improving standard of living and reduction of poverty in the long-term. The direct effects include productivity gains and low cost of production which can improve income and standard of living of users, the indirect benefits may come in form of increased supply which may translate to lower food prices. Small scale farmers and processors have the potential to enhance their standard of living as well as their food security situation if they make use of improved agricultural technologies (Langyintuo, Mwangi, Dialo, McRobert, Dixon, & Banziger, 2008).

Increase in gari output as found by the study arising from utilization of the manual screw press is in line with the findings of Okunade, Olaniyi & Ogunleye (2005) who reported increase in farmers' yield leading to increased income as a result of adoption of improved agricultural practices. This study also affirms the position of Agbarevo (2010) that increase in output as a result of utilization of improved technologies translates into increased income, which could further lead to better standard of living.

4. Conclusion

The study revealed that utilization of manual screw press by gari producers in Kwara state has lead to considerable increase in gari output, higher income, and better standard of living of gari producers. These increases would most probably lead to increase in their probability of escaping poverty, and in the long run would lead to sustainable food security for the country.

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