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Research Article

Assessment of socio-economic factors affecting the utilization of manual screw press for gari production in Kwara state, Nigeria

Abstract

This study investigated socio-economic determinants of utilization of manual screw press for cassava mash dehydration for gari production in four local government areas across the ADP zones in Kwara state, Nigeria. Using random sampling technique and a semi-structured questionnaire as research 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. Multiple regression analysis show that a correlation ($R=0.678$) exist between utilization of the screw press and the independent variables which include age, household size, level of education, years of processing experience, extension visits, and income from gari processing. R^2 value of 0.460 indicates that about 46% of the variation in utilization was explained by socio-economic variables included in the regression model. Three variables significantly influenced the decision of the respondents to utilize the manual screw press: age, level of experience, and income; the most important predictor being income with a Beta value of 0.699. Conclusively, it was recommended among others that research, extension, and policy makers consider the significant determinants identified in the study seriously if increased utilization is to be achieved by gari processors and others similar to them in the study area and the region.

Introduction

Innovative agricultural technologies exist in all facets and stages of agriculture; be it at production or at postharvest stages, and have played a major role in developing the agricultural industry [1]. Agricultural innovations are important parts of any agricultural production system and are vital in all circumstances, whether there is surplus or deficit [2]. However, increasing the efficiency of agriculture both at production and at the postharvest stage through improved agricultural technologies depends on the extent to which farmers and processors incorporate these technologies into their operations [3].

Most of the evidence about the effect of improved technologies in agriculture comes from South-East Asia (Japan, Taiwan, and South Korea etc). In South-East Asia, growth in agricultural productivity has been rapid, largely as a result of the extensive utilization of modern agricultural technologies, and for millions of poor people the technological advances of the Green Revolution provided a route out of poverty [4]. In Africa however, there are far few examples of where agricultural technology has benefited smallholder farmers on a

national scale. Particularly, [5] maintained that the utilization of agricultural innovation has been inadequate in most parts of Africa. Nevertheless, facts from Zimbabwe reveal a post-independent Green Revolution amongst smallholder farmers which have had a significant influence on poverty alleviation through the introduction of hybrid maize, expanded access to credit, guaranteed prices and marketing subsidies [6].

The implications of understanding the factors that influence farmer's decisions to utilize improved technology are colossal. Understanding these factors is essential in planning and executing technology-related programmes for meeting the challenges of food security in developing countries. To enhance technology utilization by rural agro processors, it is important to understand the factors that influence their decision to utilize technology in order to come up with technology that will suit them. Simply put, understanding some of the dynamics in improved post harvest technology utilization decision can help researchers working in the cassava processing sector to design innovations. Consequently, the variables that would be identified as key indicators towards explaining utilization of the manual screw press can be utilized within this context.

The main objective of the study is to investigate socio-economic factors influencing utilization of manual screw press for dehydrating cassava mash for gari production in Kwara state, Nigeria. Gari is pale color granular flour with slightly sour taste made from fermented, gelatinized fresh cassava roots. Gari is available to low income rural and urban households in Nigeria; it is significantly cheaper than grains. It is commonly consumed either by soaking in cold water or as a paste made with hot water. Processing gari using the screw press most importantly reduces processing time, increases output, leads to better quality product and extends shelf life of gari. What is more, understanding the factors that influence screw press utilization by gari processors is indispensable to planning and executing technology related programmes for meeting food security challenges in the country.

Material and Methods

The study was conducted in Kwara State, Nigeria, located between Latitude 8° 05' and 10° 05' North and Longitude 2° 50' and 6° 05' East of Greenwich Meridian [7]. According to National Bureau of Statistics [8], Kwara state has a land mass of 35,705 square kilometres (km²). The 2006 population census by the National Population Commission put the population of the state at 2,371,089 [9]. Agriculture and agro-processing is the main source of the economy of the state. This study evolved a cross-sectional survey research design. Multi-stage sampling technique was used to select respondents for the study. For this study, a necessary sample size of 384 was calculated and adopted using the formula by Smith [10], for determining necessary sample size when the 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. Three (3) wards from each selected local government area (LGA) were selected at random. Consequent upon the fact that it is difficult, if not impossible to come up with a 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 were selected through a simple random sampling.

Data was collected by the researcher through face to face interviews technique. To ensure that our instrument possesses both face and content validity in accordance with objective of the study, our research instrument was validated by the project supervisors and seasoned extension officials from the department of Extension and Outreach Services, Nigerian Stored Products Research Institute, Ilorin, Kwara state. Thereafter, necessary modifications were made; ambiguous items were made precise while irrelevant items were jettisoned. Afterwards, the test for reliability for the research instrument was conducted (using a test-retest method) in Ilorin, Kwara state with 20 randomly selected gari processors within an interval of two weeks. The score for each exercise was computed and subjected to Pearson product moment

correlation analysis. The Coefficient of reliability (r) was 0.7 and implied that the instrument was reliable. Afterwards our instrument was adapted and administered on gari processors selected for our study.

The combine population figure for the four local Government Areas based on figures from National Bureau of Statistics (2012) is 655300:

$$\text{Kaiama LGA} = 124015$$

$$\text{Edu} = 201642$$

$$\text{Asa} = 124668$$

$$\text{Ifelodun} = 204975$$

A simple proportion formula was used to calculate the number of gari processors who were interviewed in each local government area and ward where the study was conducted:

$$\text{Kaiama LGA} = 124015/655300 \times 100 = 19$$

$19/100 \times 384 = 73, 73/3 = 24$ respondents each for Kaiama I, Kaiama II, and Adana wards

$$\text{Edu LGA} = 20164/655300 \times 100 = 31$$

$31/100 \times 384 = 119, 119/3 = 40$ respondents each for Tsaragi I, Tsaragi II, and Lafiagi I wards

$$\text{Asa LGA} = 124668/655300 \times 100 = 19,$$

$19/100 \times 384 = 73, 73/3 = 24$ respondents each for Ogbondoroko/Reke, Afon, and Ago-oja/Osin/Sapa/Laduba wards

$$\text{Ifelodun LGA} = 204975/655300 \times 100 = 31,$$

$31/100 \times 384 = 119, 119/3 = 40$ respondents each for Omupo, Idofian I, and Idofian II wards.

In order to avoid ambiguity and a weak evaluation of the phenomenon under study, this study limited itself to the assessment of socioeconomic factors namely: age, household size, level of education, years of processing experience, extension visit(s), and income from gari processing. Multiple regression was applied for analysis of collected field data. The regression equation is used is shown below:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + e.$$

Where: Y= Utilization of the manual screw press for gari processing

a = constant term

$b_1 - b_6$ = Regression Coefficients of $x_1 - x_6$ to be estimated.

x_1 to x_6 = Independent variables as defined in the general equation

X_1 = Age

X_2 = Household size

X_3 = Level of Educational Qualification

X_4 = Level of experience

X_5 = Contact with extension agents

X_6 = Level of income from gari processing

e= error term

A priori expectation of the explanatory variables

Age is the chronological age of the respondents; age is expected to have a negative sign [11]. Household size is measured in terms of people in the household living under the care of the respondent as at the time of this study; household size is expected to have a positive or negative sign [11]. Level of education is the highest level of education attained in years; level of education is expected to have a positive sign [12]. This is the number of years respondents have been involved in gari production; level of experience is expected to have a positive sign [12]. Extension contacts are the total number of visits from extension agents in the past year; extension contact is expected to have a positive sign [11]. Level of income refers to sum total of earnings of respondents from gari processing in the past year; level of income from gari processing is expected to have a positive sign [13]. A positive sign on a parameter would indicate that the higher the value of the variable, the higher the utilization level. Simply put, if the value is positive we can tell that there is a positive relationship between the predictor and manual screw press utilization; whereas a negative coefficient represents a negative relationship.

The dependent variable (Y) is utilization of manual screw press can be viewed from two varied points; as a dichotomous dependent variable, that is to say, merely if respondents use innovation or not. Alternatively, it can be seen as extent of regularity of use of innovation and this creates a continuous dependent variable. This study used utilization as a continuous dependent variable. In other words, utilization was measured by frequency/regularity of use of the manual screw press in gari production by respondents.

Results and Discussion

NS Not significant

The model is fitted as: $Y = 6.235 + -.106(-.126) + .045(0.44) + -.024(-.031) + .116(.090) + -.051(-.212) + .699(.627) + 0.309$ (Table 1a,b).

The result of the multiple regression analysis as shown in table 2 indicates that a correlation ($R = 0.68$) exist between utilization of the manual screw press for cassava pulp dehydration and the independent variables. The R is the simple correlation between the socioeconomic variables and utilization of the manual screw press. The table also shows that R^2 (coefficient of multiple determination: R^2 measures the proportion of variation in Y explained by X) value are 0.460; indicating that about 46% of the variation in utilization of the manual screw press was explained by variables included in the

model. The remaining 54% could be attributed to the variables not included in the regression model i.e. sex, and marital status. The adjusted R^2 gives some idea of how well the model generalizes, and ideally the value should be close to the value of R^2 . The difference in R^2 and adjusted R^2 for the model is a fair bit ($0.460 - 0.452 = 0.008$ or 0.8%). This means that if the

Table 1a: Demographic attributes of respondents.

Demographic characteristics	Frequency	Percentage%	Mean
Sex			
Male	41	10.9	
Female	343	89.1	
Total	384	100	
Age			
Less than 30years	6	1.6	
30-39 years	26	6.8	
40-49 years	134	34.8	51.2
50-59 years	139	36.1	
60years and above	79	20.5	
Total	384	100	
Marital Status			
Single	14	3.9	
Married	196	50.9	
Divorced/separated	59	15.3	
Widowed	115	29.9	
Total	384	100	
House Hold Size			
1-3	95	25	
4-6	102	26.5	
7-9	95	24.6	6.4
10 and above	92	23.9	
Total	384	100	
Level of Education			
No formal education (0 years)	141	36.6	
Primary education (6 years)	129	33.5	
Secondary education (12 years)	106	27.5	
Tertiary education (14 years)	7	1.8	
Total	384	100	
Years of Experience			
Less than 6yrs	8	2.4	
6-10yrs	17	4.4	
10-15yrs	23	6.0	
16-20yrs	107	27.8	22.3
21-25yrs	104	27.0	
26-30yrs	66	17.1	
31 and above	59	15.3	
Extension Visit			
No visit	358	93.0	
1-2 times	24	6.4	
3 times and above	2	0.6	

Source: Field survey 2018

Table 1b: Demographic attributes of respondents.

Demographic characteristics	Frequency	Percentage%	Mean
Income			
Less than ₦ 200000	1	.3	
₦ 400000- ₦ 599000	4	1.0	
₦ 600000- ₦799000	16	4.4	
₦ 800000- ₦ 999000	77	20.0	₦ 1172417
₦ 1000000- ₦ 1199000	99	25.7	
₦ 1200000 - ₦ 1390000	108	28.1	
₦ 1400000 and above	79	20.5	
Total	384	100	
Other major Activity engaged in			
YES	384	100	
No	0	0	
Total	384	100	
Specific major Activity engaged in			
Handicraft	139	36.2	
Sales of agri. Products	197	51.3	
Paid employment	48	12.5	
Total	384	100	
Income from Specific major Activity			
Less than ₦ 200000	8	2.1	
₦ 200000- ₦ 399000	10	2.8	
₦ 400000-₦ 599000	178	46.2	
₦ 600000- ₦ 799000	124	32.2	₦ 623955
₦ 800000- ₦ 999000	53	13.8	
₦ 1000000 - ₦ 1199000	9	2.3	
₦ 1200000- ₦1390000	2	.5	
Total	384	100	

Source: Field survey 2018.

model were derived from the population rather than from the sample it will account for approximately 0.8% less variance in the outcome. Furthermore, because, the predictors identified in the study were only able to explain 46% of the variation in the utilization of the manual screw press indicates that there is a need to mobilize new factors.

From the result of the regression analysis as shown in table 2, the regression coefficient of age (-0.126) is statistically significant at 5% level ($P < .05$). This implies that the age of respondents is significantly related to utilization of screw press for dehydration of cassava mash for gari production in the study area. Or simply put, age composition of respondents for the study is a significant factor in utilization the of the screw press; however it was negatively significant. The negative sign of the regression coefficient of age(x_1) is in agreement with *a priori* expectation of the explanatory variable as stated earlier. That age was negative signifies an inverse relationship. In order words, the increase in age reduces the level of utilization of the manual screw press among respondents. This means that, as gari processors ages on, he/she will use the screw press less in gari processing. That is to say, age has a negative influence on utilization among the respondents. That age of respondents is

negatively related with manual screw press utilization confirms the risk aversion component in the diffusion theory; older farmers are more risk averse, and are less likely to experiment with new technology.

The finding suggests that when age increases, there would be a decline in screw press utilization among the gari processors. A possible explanation for this is that older processors have less need for extra income and do not see the need to try new methods or utilize improve methods that could increase their productivity and income. Again, as processors grow old, there is a tendency to reduce the level of adoption as their ability to cope with various processing operations diminishes.

The finding of this study corroborates with that of Wasula [14], where he found that age had a significant influence on the utilization of contour vegetative strips farming. Suleman [15], also found out in his study that age of farmers is significantly related to utilization; non-adopters were older than adopters. Kinuthia & Mbaya [16], study on determinant of technology utilization and how it affects farmers' standard of living in Tanzania and Uganda show that in both Tanzania and Uganda farmers who plant new seed varieties are relatively younger than those who do not, suggesting that as farmers age they are less open to adopting improved technologies.

Results as shown in table 2, further arbitrate that the regression coefficient of household size (0.044) is positive, but not significantly related to utilization of manual screw press for dehydration of cassava mash for gari production in the study area ($P > 0.5$). That is, a household size of respondents is not a significant factor in the utilization of the screw press. However, that regression coefficient for household size (x_2) was positively signed, agrees with the *a priori* expectation of the explanatory variable as earlier stated.

This result fully agrees with Tijjani [17], who also found the household size to be insignificant in the adoption of recommended cowpea production practices. However, our finding contradicts Bonabana- Wabbi [18] who maintains that household size influences utilization of agricultural technology in that, a larger household have the capacity to relax the labour constraints required during the introduction of new agricultural technology.

From the result of the regression analysis, as shown in table 2, the regression coefficient of the level of education (-.031) is not significantly related to utilization of screw press for dehydration of cassava mash for gari production ($P > .05$). The implication is that level of education of respondents is not a significant factor in the utilization of the screw press; education or lack of education does not affect utilization level of the screw press by gari producers in Kwara state. However, the regression coefficient for educational level(x_3) revealed a negative sign which does not agree with the *a priori* expectation of the explanatory variable as stated earlier.

The results are in agreement to those of Anaglo et al [19], where they found no significant relationship between the level of education and farmers level of adoption. The reason for this according to them may be that information on improved

livestock production practices disseminated by extension service providers were not done using materials that require high level education to use, thus all farmers having both low or high education are equally able to apply the improved technologies. This is contrary to findings of Adam & Boateng [20], who observed that education significantly influences the adoption of technological innovation in small ruminant production.

From the result of the regression analysis as shown in table 2, the regression coefficient of processing experience (0.090) is significantly related to utilization of screw press for dehydration of cassava mash for gari production in the study area ($P < .05$). That is, processing experience of respondents is a significant factor in the utilization of the screw press. This is possibly because as gari processors acquire more experience, they would have full information and better knowledge hence able to evaluate the advantage of the technology and utilize it. Furthermore, the regression coefficient for the level of experience (x_4) was positively signed in agreement with the *a priori* expectation of the explanatory variable as previously stated.

Our result is in agreement with the study of Mulaudzi & Oyeleke [21], who found significant relationship between the experience of farmers and level of adoption, although negatively related. Mulaudzi & Oyeleke explained that more experienced farmers were unlikely to adopt improved technologies, possibly because they are close to retirement, leaving less time to increase their benefit from proceeds that investment may bring. Again, our finding is in agreement with Ainembabzi & Mugisha [22], who investigated the relationship between adoption and experience with agricultural technologies and found out that there was a significant relationship between the experience of farmers and adoption of agricultural technologies in banana, coffee and maize in Uganda.

From the result of the regression analysis as shown in table 2, the regression coefficient of extension contacts (-0.212) is not significantly related to utilization of screw press for

dehydration of cassava mash for gari production in the study area ($P > .05$). That is, extension contacts of respondents are not a significant factor in the utilization of the screw press in the study area. What this means is that whether processors are visited by extension agents or not does not determine if they would use the screw press or not use it. Furthermore, the regression coefficient for extension contact (x_5) was found to be negatively signed which contradicts the *a priori* expectation of the explanatory variable as previously stated.

Our finding is consistent with that of Olaniyan [23], who found extension contact not to be significantly related to the adoption of improved cassava processing technologies. This result also corroborates the finding of the study of Suleman [15], on factors influencing the adoption and utilization of improved cassava processing technologies in Edo state, Nigeria. In his study Suleman found that extension contact of cassava processors does not have a significant influence on the adoption and utilization of improved technologies.

From the result of the regression analysis as shown in table 2, the regression coefficient of household income from gari processing (0.627) is significantly related to utilization of screw press for dehydration of cassava mash for gari production in the study area at 5% level ($P < .05$). That is, the income of respondents from gari processing is a significant factor in the utilization of the screw press. Our result shows that for every unit increase in household income from gari processing, a 0.627 point increase in utilization is predicted. This makes income from gari processing the most important predictor for utilization of the screw press for gari processing among the respondents. Furthermore, that regression coefficient of household income from gari processing (x_6) was positively signed agrees with the *a priori* expectation of the explanatory variable as stated earlier.

The result implies that the increase in income will lead to an increase in utilization of the manual screw press. This result is in consonance with the findings of Unamma [13] and Chinaka, Ogbuokiri, & Chinaka [24], who found a positive relationship between farm income and adoption; higher incomes enable farmers to acquire new or improved technologies that could be financially inaccessible to others. The result also affirms the positions of Mittal, Gandhi, & Tripathi [25] and Zhang, Fan & Cai [26,27], that there is a significant and positive relationship between income and utilization of agricultural innovations.

Conclusion

Factors that significantly affect the utilization of the manual screw press among respondents are limited to age, years of experience, and level of income. In other words, age, years of experience, and household income from gari processing were important predictors and are factors to consider in the utilization of similar technologies in the study area and comparable regions. To that end, any extension strategy for gari processors aimed at high level improved technology utilization should critically consider the roles of these factors because they have a bearing on utilization decision of the respondents. Again, majority of the gari processors are women,

Table 2: Multiple regression showing the relationship between utilization and socio-economic variables and their contribution in explaining the variability in the utilization of the manual screw press.

Variables	Unstandardized Coefficients		Standardized Coefficients	t	sig
	B	Std. Error	Beta		
(Constant)	6.235	.309		20.159	.000
AGE (X_1)	-.126**	.051	-.106	-2.459	.014
HOUSEHLD SIZE (X_2)	.044 NS	.038	.045	1.148	.252
LEVOFEDU (X_3)	-.031 NS	.050	-.024	-.607	.544
YEARS OF EXP (X_4)	.090***	.035	.116	2.536	.012
EXT. VISIT (X_5)	-.212 NS	.157	-.051	-1.353	.177
INCOME (X_6)	.627***	.038	.699	16.439	.000
R=0.68					
R ² = 0.46					
Adjusted R ² = 0.45					

** Coefficient statistically significant at 5%

hence it is important to ensure that the promotion and focus from traditional to improved processing technology for gari production does not put them in a disadvantaged position in terms of employment and income earning opportunities. It is recommend that the following amongst others would lead to increased utilization of improved agricultural technologies: creation of awareness about the technologies (no awareness no utilization), make improved technologies affordable and accessible, educate farmers/processors about the advantages improved technologies have over traditional technologies.

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