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DOI: https://doi.org/10.64388/IREV9I3-1710497-3291

Marketing of Bambaranut and Its Sustainabilty in Alkaleri Local Government Area of Bauchi State, Nigeria

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Abstract- ***The study was carried out in Alkaleri local Government Area of Bauchi State. The study analyzed Bambaranut marketing and its sustainability in the study area. Descriptive and purposive sampling procedures were used for data collection. One hundred and fifty (150) questionnaires were administered to the respondents. In each of the five villages of (Alkaleri, Maimadi, Buri-Buri, Kufa-Gandu and Kufa- Jabba of Alkaleri Local Government Area), thirty questionnaires were randomly distributed across available Bambaranut Marketers Association. Fifteen (15) questionnaires each were given to the wholesalers and to the retailers in each of the five wards. The data collated was further analyzed using descriptive statistics, percent marketing margin, marketing channel and regression analysis. However, the percent marketing margin of wholesalers 5.93% is less than the retailers 34.24% this indicates that the retailers make more profit than the wholesalers. The regression analysis also showed that the coefficients of selling price, transportation costs and storage costs were significant at less the 1% respectively and affects the wholesalers' income positively. While buying was significant at 1% and negatively affects the wholesalers' income. It can be concluded from the present study that, Bambaranut marketing in Alkaleri Local Government Area is a profitable business. The retailers made more profit than the wholesalers. It can also be concluded that factors such as infestation from insect, rodents, acquiring a warehouse and high cost of storage facility were major constraint in the marketing of Bambaranut among others. From the findings of the present study, it can therefore be recommended that there should be provision of adequate market infrastructural facilities to the marketer's cooperatives in form of storage facilities, marketing stalls which will allow for smooth and sustainable functioning of bambaranut marketing in the study area. However, improving transportation, market price information and good government policies can help sustain the marketing of Bambaranut in the study area.***

Index Terms- ***Marketing, Bambaranut, Sustainability, Alkaleri, Bauchi State, Nigeria***

I. INTRODUCTION

Bambara nut (*Vigna subterranea* (L.) Verdc.) is the third most important food legume crop in Semi-Arid Africa in terms of production and consumption after groundnut (*Arachis hypogaea* L.) and cowpea (*Vigna unguiculata* (L.) Walp.) (Aremu *et. al*. 2006), the cultivation of which precedes that of groundnut. Although rarely grown in Asia and elsewhere, its cultivation is rare outside the African continent. The spreading of wild Bambara nut is known to extend from Jos Plateau and Yola in Nigeria, to Garoua in Cameroon (Goli, 1997). It is in West Africa that most of the world's Bambara nut is grown and where the crop is most projecting in the traditions of rural communities. According to Yao *et al*. (2005), Bambara nut plays an important role in the traditional food and culture of people in the western and northern parts of Côte d'Ivoire. Bambara nut is now widely distributed in the semi-arid zone of sub-Saharan Africa and most authors seem to support the view that, it is the third most important food legume after cowpea (*Vigna unguiculata*) and groundnut (Mkandawire, 2007). Bambara nut is important for smallholders and their households because the beans are important sources of food security, being nutritious and high in protein. Although, in common with other legumes, Bambara nut is deficient in sulphur-containing amino acids (Azam-Ali *et al*., 2001), some genotypes contain higher amounts of methionine and lysine than is found in other legumes (NRC, 2006).

The crop is grown by subsistent farmers under traditional low input agricultural systems. It is a source

of revenue for subsistence farmers and provides fodder for livestock and it is rich in protein. This crop is also rich in carbohydrates and lysine (Ngwako et al. 2013) and hence constitutes a balanced diet to the rural people that consume it as a sole or mixed with other meals. The leguminous plant is mainly grown for its underground seeds, which are eaten fresh, semi-ripe or as pulse when dry and mature or ground into flour for later use (Toure *et al*. 2012). Anyika et al. (2009) reported that combined protein of legumes and cereals may be better than casein or other animal sources. It also contributes to the soil fertility through biological nitrogen fixation making it beneficial in crop rotations and intercropping, hence farmers do not normally apply chemical nitrogen fertilizers to Bambara groundnut (Mkandawire, 2007). So far, 1815 accessions of Bambara nut are held by International Institute of Tropical Agriculture (IITA) in Nigeria where most of the material has been characterized or evaluated (Goli 1995). The Institute of Research for Development (IRD) in France also holds about 1000 accessions of Bambara groundnut as reported by Somta *et al*. (2011). The grains are consumed when boiled or burst as well as flour for infant nutrition while the fodder is used for animal feeding. Despite its importance, Bambara nut is considered as neglected and underutilized crop, the reason that to date no research activities were undertaken by scientists. Nevertheless, it continues generating incomes for small scale farmers so that the lack of interest by researchers will not cause in long term serious genetic erosion of this crop. In order to improve farmers' practices we need to understand how farmers use their own indigenous knowledge in cultivating Bambara groundnut production.

(Azam-ali et al. (2001) reviewed the contribution of research towards developing the potential of bambaranut. Although initiatives to develop and commercialize the crop have been largely unsuccessful, primarily due to barriers to the establishment of functional value chains, this is the first review of bambaranut to include aspects of commodity marketing.

The rate at which the World's population is presently increasing in relation to agricultural growth indicates that not only should the production of main crops be increased, but that other crops that are neglected should be given attention. Among the latter group of crops is the Bambara nut (*Vigna subterranea*n (L) Verdc.), which flourished in Africa before the introduction of the peanut (*Arachis hypogaea*) (Goli et al. 1991).

The commercial need has made the cultivation of Bambara nut to be grown throughout the country, with the exception of the riverine and swampy areas. Wide range of differences exist in the seed coat colour, seed sizes, pigmentation around the eye, pod shape, growth habitat and other characteristics of the crop across the country. There appears to be little or no significant research effort directed towards the improvement of Bambara nut post-harvest handling and processing operations even in the main production center of North Eastern Nigeria. The rigours involved in the harvesting and processing of the crop has made farmers to show little interest in its commercial production. Even though changes in attitude are now taking place, the effect on production level has not been significant.

Women are responsible for half of the world's food production, and in most developing countries as Nigeria produce between 60 and 80 per cent of the food, yet they continue to be regarded as home producers or assistants on the farm and not as actual farmers and economic agents (Nuhu *et al*., 2014). Women also typically have limited access to land, education, information, credit, technology, and decision-making power. Land is a very crucial farm resource, without which there would be no agricultural production. Unfortunately, patriarchal structures and authorities give more resources to men, resulting in women having less access to productive resources, including land. In many developing countries, land is predominantly owned by men and transferred inter-generationally to males. Some religious laws forbid female ownership of land which in turns affect the commercial production of Bambara nut among other crops. And even where women hold parcels of land, they are small, less fertile, and less conducive to efficient farming practices.

Marketing of Bambara nut is crucial for agricultural development and the attainment of the sustainable development among Bambara nut producing households in Alkaleri L G.A. and Nigeria as a whole.

The concept of agricultural marketing is gaining fame among farmers, farm product based Agricultural produce businessmen and researches in other to contribute to rural development through income generation in both developed and developing countries.

The general objective of this study is to examine the marketing of Bambara nut in Alkaleri L.G.A. of Bauchi State, Nigeria.

The specific objectives are;

i. To calculate the marketing margin of Bambara nut in the study area;
ii. to describe the marketing channels of Bambara nut in wholesalers and retailers;
iii. to identify the factors that affect Bambara nut marketing at both wholesale and retail levels; and
iv. to describe the roles of gender and identify the constraints in Bambara nut marketing in the study area.

II. METHODOLOGY

The study was carried out in Alkaleri L.G.A. of Bauchi State, which was created on the 3 February 1976. The state has twenty (20) L.G.As and shares boundaries to the east with Adamawa, Yobe and Gombe States. To the south, it equally shares common boundaries with Plateau and Taraba State, while to the North it is with Kano and Jigawa State and to the West with Kaduna State. Bauchi State lies on Latitude and longitude coordinates of 10.314159, 9.846282 respectively. The activities of bambaranut farmers and marketers is prominent and preponderance in the L.G.A. call for this investigation

Sampling and Sampling Size

Alkaleri L.G.A. is made up of three (3) districts namely, Pali, Duguri and Gwana districts. Bambara nut is produced in commercial quantity basically in Pali district by the Beri-Bari ethnic group. The major villages where the crop is grown includes: Alkaleri, Maimadi, Buri-Buri, Kufa-Gandu and Kufa- Jabba.

Purposive sampling was used to select the respondents in the study area particularly in the major villages where the crop is grown in commercial quantity. In each of the five villages, thirty questionnaire each was randomly distributed across available Bambara nut Marketers Association. The total number of questionnaires administered was one hundred and fifty (150).The data for this study was obtained primarily by the use of a well-structured questionnaire.

Analytical Framework

Different methods of data analysis were employed in the study. Descriptive statistics was used to realize objectives (i) and (v); while percent marketing margin was used to achieve objective (ii), marketing channels for Bambara nut sales from point of production to point of sale, to final consumers were obtained from asking the respondents in-depth questions and used to achieve objective (iii).

The Ordinary Least Signal (OLS) regression analysis was used to achieve objective (iv)

The implicit regression model for wholesalers was

$Y= f (R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8 + R_9) +e.$

Where:

Y= Income

R_1 = Buying price/selling price (₦)

R_2 = storage cost (₦)

R_3 = transportation cost in Naira (₦)

R_4 = quantity purchased (kg)

R_5 = cost of Packaging (₦)

R_6 = years in business

R_7 = Duration of storage (Months)

R_8 = Cost of loading (₦)

R_9 = Cost of off loading (₦)

And that of retailers is:

$Y= f (P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8 + P_9) +e.$

Where:

Y= Income

P_1 = Buying price

P_2 = selling price

P_3 = storage cost

P_4 = transportation cost in Naira =N=

P_5 = quantity purchased

P_7 = years in business

P_8 = Length of storage

P_9 = Cost of loading

P_{10} = Cost of off loading

U = error term

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DOI: https://doi.org/10.64388/IREV9I3-1710497-3291

The functional forms that will be tested are as follows:
Linear form:
$Y= R_0 X_0 +R_1X_1 + R_2X_2 + R_3X_3 + R_4X_4 + R_5X_5 + R_6X_6 + R_7X_7 \ldots. R_nX_n + U.$
Semi-long equation:
$Y= R_0 X_0 +R_1InX_1 + R_2 InX_2 + R_3InX_3 + R_4 InX_4 + R_5 InX_5 + R_6InX_6 + R_7InX_7 \ldots. R_nX_n + U.$
Double-log:
$In\ Y= R_0 X_0 +R_1InX_1 + R_2 InX_2 + R_3InX_3 + R_4 InX_4 + R_5 InX_5 + R_6InX_6 + R_7InX_7 \ldots. R_nX_n + U.$
The lead equation will be chosen based on the following criteria by Olayemi (1998):
Relative magnitude of adjusted R:
Related F-value of the model; and
Where more numbers of factors are statistically significant.

III. RESULT AND DISCUSSION

Determination of Percent Marketing Margin at wholesale and retail level for Bambara-nut in the Study Area

The results for margin on weekly average sales made by a Bambara-nut wholesaler in the study area showed that wholesaler selling price for Bambara-nut was ₦4,000,000 the average buying price was ₦3,776,000 and the average margin was 5.93% and the average retail selling price for Bambara-nut was ₦217,083.33, average buying price was ₦161,708.33 with an average percent margin 34.24%

The percent marketing margin for Bambara-nut wholesaler was 5.93%, the average wholesaler selling price for Bambara-nut was ₦4,000,000, average retail buying price was ₦161,708.33hence, the retail marketing margin for Bambara-nut was 34.24% on an average sale.

Thus, the percentage marketing margin for wholesaler was 5.93%, and the retailer 34.24%. Therefore, wholesaler percent margin was 5.93% less than the average percent margin of the retailer.

$$\text{Percent Marketing Margin} = \frac{\text{wholesaler selling} - \text{wholesaler buying price}}{\text{wholesaler buying price}} \times \frac{100}{1}$$

The result gathered from wholesaler in the study area showed that the average selling price for bag of Bambara-nut was ₦4,000,000 and the average buying price was ₦161,708.33. The mean marketing margin of Bambara-nut wholesaler was therefore 5.93%. The percentage of marketing margin between the wholesaler and the retailer is different, the wholesaler is gaining less than the retailer.

$$\text{Percent Marketing Margin} = \frac{\text{Retailer selling} - \text{Retailer buying price}}{\text{Retailer buying price}} \times \frac{100}{1}$$

From the information gathered from the retailers in the study area, the average selling price for a bag of Bambara-nut was ₦ 217,083.33 and the average buying price was ₦157,000. The mean marketing margin for Bambara nut retailer was therefore 34.24%.

The percent of marketing margin between the retailer and wholesaler is different, the retailer is gaining more than the wholesaler.

IV. MARKETING CHANNEL OF BAMBARANUT MARKETING IN THE STUDY AREA

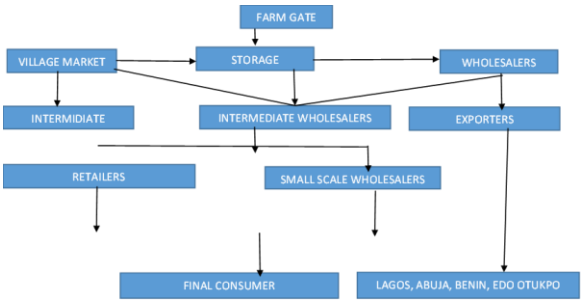

Figure 3: Marketing Channel of Bambara nut in the Study Area.

The diagram above in Figure 3 shows the marketing channel of Bambaranut in the study area. Bambara nut marketing begins at the farm after which it is taken to the store for storage thereafter when taken the product to the local market, the farmer pays commission to the commission agents. Wholesalers who are of different types (intermediate and large scale wholesalers) who buys from 1-50 bags and 50bags and above come to buy at the local markets in 100kg bags.

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DOI: https://doi.org/10.64388/IREV9I3-1710497-3291

The intermediate wholesalers sell off their purchase the same day to retailers who sells in small measures. On the other hand, the large scale wholesalers take Bambara nut purchased to major cities for sale to small scale wholesalers (who buys from 5 - 10 bags at once) and store some for the period when there is short supply of the product. The also sell to retailers and export some to neighboring countries such as Lagos, Abuja, Benin, Edo and Otukpo. The retailers in this study are those who buy below 50bags of Bambara nut at a time from the wholesalers and they sell in different measures to the final consumers.

V. REGRESSION ANALYSIS OF WHOLESALERS AND RETAILERS

Table 6: Factors that Affects Bambaranut Wholesale Price (₦)

Variables	Coefficients	standard error	t-Statistics
(Constant)	63.634	7.852	8.104
Buying price (N)	-20.854	0.721	-28.909*
Selling price (N)	15.577	0.494	31.508*
Transport cost (N)	0.012	0.009	1.410*
Quantity purchased (N)	0.018	0.038	0.481
Storage cost (N)	0.048	0.051	1.873*
Years in market	0.008	0.061	-0.221
Loading cost (N)	-0.056	0.061	-0.921
Offloading cost (N)	0.007	0.060	0.115

* = significant at 1%
R-Square R^2 = 0.958 F-cal = 187.385
F-tab = 2.21
Adjusted R-Square = 0.953 Durbin-Watson Stat = 1. 607
Source: Field Survey, 2022

Wholesale level of Bambaranut

Table 6 shows the regression results of bambaranut wholesalers in the study area, the R^2 value of 0.958 which signifies that 95.80% of the variation in the income of wholesalers is accounted for by variations in the eight variables put together. The adjusted R^2 also supported the claim with a value of 0.953 or 95.30%. This implies that the independent variables explain the behavior of the dependent variable at 95% level of confidence. The Durbin-Watson (DW) statistics of 1. 607 which is approximately 2, shows the absence of multicollinearity. The coefficients of selling price, transportation costs and storage costs were significant at less the 1% respectively and affects the wholesalers' income positively. While buying was significant at 1% and negatively affects the wholesalers' income.

The calculated F statistic value of 187.358 which is greater than any value in the F-table implies that there is a significant impact between the dependent and independent variables, thus the null hypothesis was rejected and the alternate accepted which states that there is a significant relationship between the selling prices of wholesaler in the study area.

Table 7: Factors that Affects Bambaranut Retail Price (₦)

Variables	Coefficients	Standard Error	t-Statistics
(Constant)	14953.053	25519.003	586
Buying price (N)	-0.443	496	-893
Selling price (N)	0.571	0.033	17.465*
Transport cost (N)	0.251	0.176	1.431**
Quantity purchased (N)	-264.883	103.646	-2.556*
Storage cost (N)	0.300	0.155	1.930*
Years in market (N)	-2783.550	1841.755	-1.511**
Loading cost (N)	48.346	68.119	0.710
Offloading cost (N)	-183.928	86.167	-2.135*

* and ** = significant at 1% and 5% levels respectively.
R-Square R^2 = 0.841 F-cal = 43. 655
F-tab = 2.21

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DOI: https://doi.org/10.64388/IREV9I3-1710497-3291

Adjusted R-Square = 0.822 Durbin-Watson Stat = 2. 007
Source: Field Survey, 2022

Retail level of Bambaranut
The R^2 value 0.841 or 84.10% explains the variation in Bambaranut retail price as accounted for by the independent variables put together in Table 4.12., the R^2 –adjusted of 0.822 or 82.20% further supports this claim. The coefficient of quantity purchased, years in marketing and offloading cost were negative, but were significant at 1% levels of probability. This implies that a decrease in these factors would cause a reduction in selling price. Selling price, transportation cost were significant at 5% level of probability and storage cost was significant at 1%, they all have positive coefficients, indicating that an increase in these factors would lead to an increase in the wholesale selling price of Bambaranut and thus, increasing the retailers income.

The F-calculated was greater than F-tabulated value, showing that there is a significant relationship between the dependent variable and independent variables. Thus, hypothesis 2 which stated that there was significant difference between the retail selling of Bambaranut in the study area was rejected and the alternate accepted.

Table 8: ROLE OF GENDER IN BAMABARANUT MARKETING

Gender	Frequency	Percentage (%)
Males	72	48
Females	78	52
Total	120	100

Source: Field Survey, 2022
Distribution role of Gender in Bambaranut marketing
Table 8 shows that 51.7% of the respondents in the study area were females and 47.7% were males. This shows that females participate in marketing of Bambaranut more than the males.

Table 9: Constraints Faced by Bambara nut Marketers

Problems faced	Frequency	Percentage (%)
Acquiring a warehouse	24	16.0
Infestation from insect	79	52.7
Rodents	24	16.0
High cost of storage facility	8	5.3
Others	15	10.00
Total	150	100

Source: Field Survey, 2022

Respondent distribution on constraints faced

Table 10 above shows that 52.7% of the respondent in the study area were faced with the problems of infestation from insect, while 16.0% of the respondent were faced with the problems of rodents and also 16.0% of the respondent are faced with the challenge of acquiring a warehouse while 5.3% of the respondent were faced with the challenge of high cost of storage facilities. This indicates that more than half of the bambaranut marketers in the study area were affected by these problems. Thus, methods of storage should be improved upon.

Table 11: Sustainability Strategies for Bambaranut marketing

Sustainability of bambaranut marketing	Frequency	Percantage (%)
Government providing improved seeds	15	10
Provision of storage facility	35	23
Government buying off their produce at a good price	30	20
Provision of agricultural loan	70	47
Total	150	100

Source: Field Survey, 2022

Respondents distribution on sustainability strategies of bambaranut marketing
In Table 13, it is revealed that provision of agricultural loan response was 47%, provision of storage facility 23%. It indicates that if the marketers of bambaranut have adequate capital they can increase their

purchasing power and expand their markets to be of international standard. Storage facility if provided by the government will enable them have bambaranut for sale during on and off season.

CONCLUSION

Bambaranut marketing in Alkaleri Local Government Area is a profitable business. The retailers made more profit than the wholesalers. Infestation from insect, rodents, acquiring a warehouse and high cost of storage facility are a major constraint in the marketing of Bambaranut among others.

RECOMMENDATION

Based on the findings of the research, it is recommended that there should be provision of adequate market infrastructural facilities to the marketer's cooperatives in form of storage facilities, marketing stalls which will allow for smooth and reliable functioning of bambaranut marketing in the study area.

Also, agricultural loans, marketing loans and credit should be made available to marketers at a low interest rate to help them finance their marketing activities. Furthermore, a good method to take care of pest infestation should be improved upon.

Finally, it is recommended that policies which enhances greater market efficiency in the state should be encouraged. This could be achieved by improving transportation and market price information.

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