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## ECONOMICS OF MILLET MARKETING AT LARANTO (KATAKO) MARKET, JOS NORTH LOCAL GOVERNMENT AREA OF PLATEAU STATE, NIGERIA

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### ABSTRACT

*This study analyzed the economics of millet marketing at Laranto (Katako) market in Jos North Local Government Area of Plateau state. A purposive and random sampling technique was used for this study to select 60 respondents. Data collected were analyzed using the following analytical tools; descriptive statistics, Herfindahl-Hirschman Index (HHI), marketing margin and efficiency and Ordinary Least Square (OLS) regression analysis. The result of the study revealed that most (87%) were male, the mean age was 41 years, 78% were married, most(55%) had primary school(≤6 years) education, most(47%) of the respondents had marketing experience of between 15-29 years, 63% had access to market information, and 47% were retailers/farmers. The marketing margin (profit) and efficiency were estimated at ₦3,650 and 0.34 respectively. The Herfindahl-Hirschman Index (HHI) estimate was 4,850 which is an indication of market concentration. The estimate of the coefficient of multiple determination ( $R^2$ ) was 0.727, suggesting that 73% of the variation in the marketing margin of millet grains was accounted for by the variables in the regression model. The coefficients of marketing experience (0.087), market information (0.254), quantity supplied (0.642) and marketing costs (-0.488) were statistically significant at 5% level. The significant constraints associated with millet grain marketing identified by the respondents were; inadequate capital (91.7%), high marketing cost (83%), price fluctuation (80%), and poor storage facilities (75%). Based on the findings of this study, policy actions should be channeled towards ameliorating these constraints to improve profitability and reduce marketing costs in millet grain market chain.*

**Keywords:** Market performance, market concentration, determinants of market margins, market constraints.



## INTRODUCTION

Millet is an important cereal that makes up about two- third of the total cereal production in Africa (FAO, 2008). It is a major staple diet to millions of households in Nigeria and a crucial resource to the small-scale farmers as well as those making it available in the markets. Millet is a cereal crop belonging to the grass family Graminae. Millet is the seventh most important cereal crop globally, and an important coarse grain food crop in Africa and South Asia (ICRISAT, 2005). Thus it is a staple grain for about 90 million people living in the Semi-Arid Tropical Regions of Africa and the Indian sub-continent (Gulia et al., 2007). The market for food staples remains central to many agricultural-based economies because staple foods constitute such a major share of household food expenditures (IFPRI, 2008). Millet is the most commonly used as animal feed, grain and forage around the world. In the industrial sector, millet is a major ingredient in fuel and ethanol production with a 30% greater fermentation and high protein and fat content than maize (Gulia et al., 2007). In a household food basket, millet is an important ingredient for both children and adults. Compared to maize and potatoes, millet performs well under hot and dry climatic conditions. India, Niger, Nigeria, Sudan, Mali, Burkina Faso and Senegal are the major countries contributing to world millet market chain which account for 28 million ha of area production with an output of 21.8 million tonnes (Murty et al., 2007). Sub-Saharan Africa annually produces about 13 million tons to the world millet market chain (FAO, 2003). The main challenges that limit wide scale millet production and marketing include: poor production systems, weak management practices, inadequate equipment availability, low developed marketing channels, lack of base price for pearl millet and poor grain storage infrastructure (Gulia et al., 2007;). The problems of grain availability, cleaning and processing, along with uncertainty regarding consumer demand place millet at a distinct disadvantage relative to maize (Rohrbach, 2004). In addition, the processing of millet is complicated by the necessity of removing the outer skin (or hull) of the grain before milling can take place. Therefore access to processing technology could help to provide new market opportunities by increasing shelf life and/or adding value (Reddy, 2013). Being gluten-free, marketing opportunities for the crop exists in the health-food outlets (Gulia et al., 2007). Pabuayon and Medina (2007) argued that linking farmers to markets and supporting value adding activities can raise their income and thus provide incentives for improving their management practices toward greater farm productivity. However by examining the market chain, it is possible to determine how value adding and marketing activities take place, who performs and benefits from these, and what are the constraints that need to be overcome by those who desire to benefit from value addition (Pabuayon *et al.*, 2009). The market chain analysis ensures that a whole range of interconnected problems associated with millet market chain are addressed (ACT, 2007). These include identifying critical constraints to improved market performance, alleviation of constraints, smallholder commercialization and its contribution to growth level of market participation, policy choices and identification of innovative ways to link public funding with private sector resources (Moldova, 2010). This study examines the various impediments to millet grain marketing and provides the window of opportunity on how to alleviate the marketing constraints, the effects of how millet value addition can increase the market performance and facilitate farmers to capture high value markets in the millet grain market chain.

Millet grain trade is mostly inefficient. There is relatively little long-distance between farms and markets in millet trade (Rohrbach and Kiriwaggulu, 2007). Although millet is the staple food crop, its commercial utilization is limited to very few uses. Various studies have been conducted on millet such as increasing utilization of millet based food (DFID, 2010), adoption of improved technologies for millet production (Mwanga, 2002) and commercialization prospects for millet (Rohrbach and Kiriwaggulu, 2007). However, its productivity has stagnated at 200-800kg/ha against the global potential of 1,500-3,000kg/ha (FAOSTAT, 2009). And as a result, local production has not met consumers' demand making millet producers to be classified as poor with limited alternative to food, feed and fodder needs. In terms of marketing, a simplified marketing structure in which farmers sell to traders who in turn sell to final consumers or processors exists. Because of this simplicity, millet grain traders grumble with inadequate market access in terms of low and uncompetitive grain prices which usually collapse during periods of harvest, market exploitation, poor developed and fragmented marketing channels with weak value chains, exploitation by middlemen and mistrust amongst market chain actors causing low returns. Traders complain of low volumes produced by farmers resulting in high assembly costs, inadequate all year round grain supply, high cleaning costs, poor quality grains, low access to credit, lags in policy frameworks and limited market information. Rohrbach, (2004) and Gulia et al. (2007) respectively describe millet markets as poorly developed with fragmented marketing channels and weak value chains with high assembly and processing costs thereby lowering actors' income and overall sub-sector competitiveness. The problem of limited market access has been associated with inefficiencies along a market chain due to limited resources necessary in helping millet grain traders meet quality standards and formal market specifications. Also, dearth of trust between millet grain traders and lack of formal contractual arrangements has acted as impediments to investments in the millet grain marketing chain (Africa 2000 Network, 2007). In addition, little information exists concerning the distributional implication of millet market structure, market channel efficiency and its determinants. As a result, the characteristics of millet market chain have remained scanty in literature. This study fills this knowledge gap by analyzing the efficiency and performance of millet markets in terms of market margins and costs. Understanding market channel efficiency provides relevant information concerning operational mechanism of millet markets and thus a basis of reducing marketing inefficiencies along the market chain. In addition, information concerning agricultural market margins and costs provide excellent evaluation criteria for input-output market performance thus complimenting the ever increasing literature on transaction cost analysis. This study attempts to place renewed attention on millet marketing and trading practices, identify the various categories of millet grain traders, measure the market concentration, estimate the market performance, determine factors that affect market margins and identify constraints associated with millet grain marketing in the study area. Therefore the specific objectives of this study were to;

- i. Describe the socio-economic characteristics of millet grain traders;
- ii. Measure the market concentration of millet market chain;
- iii. Estimate the market performance of millet grain traders;
- iv. Determine factors that affect the marketing margin (profit) of millet grain traders;
- v. Identify the constraints associated with millet grain marketing.

## METHODOLOGY

### Study Area

This study was carried out at Katako market in Jos North Local Government Area of Plateau state. Jos North Local Government Area is the administrative capital of Plateau state. Jos metropolis is located North-West of the middle-belt of Nigeria on latitude 7° and 11° North and longitude 7° and 25° East. Jos is located at geographical centre of Nigeria about 288km from Abuja, the capital of Nigeria (FAOSTAT, 2009).

### Method of Data Collection

Primary data for the study was collected using a well-structured questionnaire.

### Sampling Procedure

Purposively, Laranto (Katako) market was selected in Jos North Local Government Area of Plateau state, because it has the largest population of food grain traders in the study area. Questionnaires were administered on market days with the assistance of the executives of the food grain traders association. A total of sixty (60) respondents were considered for this study.

### Analytical Techniques

The following analytical tools were used for these study; Descriptive statistics was used to analyze objectives i and v, Herfindahl-Hirschman Index (HHI) was used to analyze objective ii, Marketing margin and efficiency was used to analyze objective iii and Ordinary Least Square (OLS) regression analysis was used to analyze objective iv.

### Model Specification

#### Market Concentration

The Herfindahl-Hirschman Index (HHI) is a common measure of market concentration that is used to determine market competitiveness in trade transactions. The Herfindahl-Hirschman index (HHI) is a commonly accepted measure of market concentration. The closer a market is to a monopoly, the higher the market concentration (and the lower its competition). If, for example, there were only one firm in an industry, that firm would have 100% market share, and the Herfindahl-Hirschman Index (HHI) would equal 10,000, indicating a monopoly. If, there were thousands of firms competing, each would have nearly 0% market share, and the HHI would be close to zero, indicating nearly perfect competition. A market with an HHI of less than 1,500 is considered to be a competitive marketplace, a HHI from 1,500 to 2,500 is considered to be a moderately concentrated marketplace, and a HHI of 2,500 or greater is considered to be a highly concentrated marketplace (Wooldridge, 2000). The HHI is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers, The HHI is expressed as:

$$HHI = s_1^2 + s_2^2 + s_3^2 + \dots + s_n^2 \dots \dots \dots (1)$$



Where;

HHI = Herfindahl-Hirschman Index

s = market share of each firm (expressed as a whole number, not a decimal)

### Market Performance

An efficient marketing system minimizes the cost of a marketing process; ensures greater returns to producers while at the same time provide final consumers with quality products and at a reasonable price. In measuring market performance, marketing margin and marketing efficiency analysis were employed.

### Market Margin Analysis

The marketing performance of millet was assessed by the computation of marketing margins. Market margins are the difference between prices at different market levels in the marketing system. Marketing margin measure the share of the final selling price that is captured by a particular class of trader in the marketing chain. However, the term also refers to the difference between producer and consumer prices of an equivalent quantity and quality of a commodity or it may also be described as price differences between two points in the marketing chain. Market margin (Profit) is an important measure in trade transactions, as it gives the trader a measure of how much profit it's making on merchandise sales, the size of a marketing margin indicates the amount of value (profit) added by marketing system. The total marketing margin may be subdivided into different components; all the costs of marketing services and profit margins or net returns. An analysis of marketing costs would estimate how much expenses were incurred for each marketing activity. It would also compare marketing costs incurred by different actors in the path of distribution. The analysis of marketing margin was computed by comparing the difference between millet selling and cost prices at different trade levels. The computation employed the following formula:

$$MM = P_2 - P_1 \dots\dots\dots(2)$$

Where;

MM = market margin between level 1 and 2 in (₦/kg);

P<sub>1</sub> = price at market level 1 (farm gate/cost price and marketing costs), in (₦/kg);

P<sub>2</sub> = price at market level 2 (selling price) in (₦/kg).

### Marketing Efficiency

A marketing efficiency is a ratio of marketing margin to marketing costs (Sreenivasa et al., 2007). Marketing efficiency is the maximization of ratio of output to input. Marketing efficiency is the most frequently used measure of market performance. Improved marketing efficiency is a common objective of farmers, wholesalers, retailers, commodity traders. The following marketing efficiency notation was adopted in this study.

$$M. E. = \text{Marketing margin (profit)/ Cost of marketing} \dots\dots\dots (3)$$

Note;

If M.E. = 1, marketing is efficient

If M.E. < 1, marketing is inefficient  
 If M.E. >1, marketing is highly efficient

### Ordinary Least Square (OLS) Regression Model

The Ordinary Least Square (OLS) regression was used to determine the factors affecting marketing margin of millet grains. The Ordinary Least Square (OLS) regression model gave the best fit and was chosen as the lead equation on the basis of the number of significant variables, magnitude of the coefficients, statistical and econometric criteria. The OLS regression was used to establish the effects of socio-economic characteristics of the respondents on marketing margin of millet grains (Wissmann, et al., 2007; Greene, 2002). This model can also be written in matrix notation as;

$$y_i = \beta_0 + \beta_i x_i + e_i \dots\dots\dots(4)$$

Where:

$y_i$  = Marketing margin (₹/kg)

$x_i$  = vector of the predictors (exogenous/ socio-economic variables)

$\beta_i$  = vector of the estimated parameters.

$\beta_0$  = Intercept term

$e_i$  = error term

In its explicit form, the model is expressed as follows;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon_i \dots\dots\dots (5)$$

Where;

Y = Marketing margin (₹/100kg bag)

$\beta_0$  = intercept

$\beta_1 - \beta_6$  = Coefficient of parameters to be investigated

$X_1$  = Gender (yes=1; no=0)

$X_2$  = Marital status (married=1; single=0)

$X_3$  = Marketing experience (years)

$X_4$  = Marketing information access (yes=1; no=0)

$X_5$  = Quantity supplied (kg)

$X_6$  = Marketing cost (₹)

$\varepsilon_i$  = Error term.

## RESULTS AND DISCUSSION

### Socioeconomic Characteristics of the Respondents

Socioeconomic characteristics differ among millet grain traders and have influence on the supply and marketing of millet. Socio-economic features studied include age, gender, education, marital status, quantity of millet supplied, access to marketing information and marketing experience.

### Age of the Respondents

**Table 1: Distribution Based On the Age of the Respondents**

Age	Frequency	Percentage (%)
≤29	15	25
20-49	35	58.3
≥50	10	16.7
Mean = 41 years		

Source: Field Survey, 2017

Findings showed that most of the respondents are within the age bracket of 20-49 years, while the mean age of the respondents was 41 years. The implication is that most of the respondents are in their economically active age bracket and thus were able to undertake higher business risks associated with marketing.

### Marital Status of the Respondents

**Table 2: Distribution Based on the Marital Status of the Respondents**

Marital status	Frequency	Percentage (%)
Married	47	78.3
Single	13	21.7

Source: Field Survey, 2017

Most (78.3%) of the respondents were married, indicating additional labour supply required in carrying out some marketing functions.

### Gender of the Respondents

**Table 3: Distribution Based on the Gender of the Respondents**

Marital status	Frequency	Percentage (%)
Male	52	86.7
Female	8	13.3

Source: Field Survey, 2017

The result further revealed that most (86.7%) of respondents were males and this reaffirms earlier research findings that food grains marketing in the study area was a male dominated activity.

### **Educational Status of the Respondents**

**Table 4: Distribution Based on the Educational Status of the Respondents**

Educational status	Frequency	Percentage (%)
Primary ( $\leq 6$ years)	33	55
Secondary (7-13 years)	18	30
Tertiary ( $\geq 14$ years)	9	15

Source: Field Survey, 2017

The educational status of the respondents showed that most (55%) had attained primary education ( $\leq 6$  years). This indicates that education is not a barrier to their trade transactions.

### **Marketing Experience of the Respondents**

**Table 5: Distribution Based on the Marketing Experience of the Respondents**

Marketing experience	Frequency	Percentage (%)
$\leq 14$ years	22	36.7
15-29 years	28	46.7
$\geq 30$ years	10	16.6

Source: Field Survey, 2017

Millet supply experience showed that most (46.7%) had 15-29 years of Millet supply experience. Therefore, the more experience a marketer is, the higher his understanding of a marketing system, conditions and price trends.

### **Access to Market Information**

**Table 6: Distribution Based on Their Access to Market Information**

Market information	Frequency	Percentage (%)
No	22	36.7
Yes	38	63.3

Source: Field Survey, 2017

Most (63.3%) of the respondents have access to market information. This implies that millet grain traders with access to market information will purchase grains at cheaper prices, sell more commodities and receive higher market margins (profits). This result corroborates with the works of Ugwumba (2009) on Nigerian maize marketers.



## Quantity Supplied by the Respondents

**Table 7: Distribution Based on the Quantity Supplied by the Respondents**

Quantity supplied (kg)	Class of trader	Frequency	Percentage (%)
≤1,999	Farmer/Retailer	39	65
2000-4999	Middlemen/Agent	12	20
≥5000	Wholesaler	9	15

Source: Field Survey, 2017

Most (65%) of the respondents supplied between ≤1,999kg of millet grains. This is an indication that most of the millet grain traders belong to the class of retailers. This result corroborates with the works of Ugwumba (2009) on Nigerian maize marketers.

## Market Concentration

**Table 8: Percentage (%) Market Share for Each Class of Trader**

Class of trader	Percentage (%) market share
Farmer/Retailer	65
Middlemen/Agent	20
Wholesaler	15

Source: Field Survey, 2017

The Herfindahl-Hirschman Index (HHI) was used to measure the market concentration and determine market competitiveness in trade transactions. It is calculated by taking the market share for each class of trader in the market (Table 8), square them, and sum the results:

$$\text{Herfindahl-Hirschman Index (HHI)} = 65^2 + 20^2 + 15^2$$

$$= 4,850$$

The Herfindahl-Hirschman Index (HHI) estimate was 4,850 which is an indication of market concentration, hence, Herfindahl-Hirschman Index (HHI) of greater than 2,500 ( $\geq 2,500$ ) is assumed to be a highly concentrated marketplace.

## Market Performance

**Table 9: Marketing Margin and Efficiency of Millet (₦/100kg Bag)**

Variable inputs	Cost (₦/100kg bag)	Percentage (%)
(A) Sales revenue (selling price)	14500	
Total sales revenue	14500	
(B) Marketing cost:		
i. Purchase price	9500	87.6
ii. Transportation cost	300	2.7
iii. Market/union charges	200	1.8
iv. Cost of agrochemicals	500	4.6
v. Storage cost	100	1
vi. Packaging & handling cost	250	2.3
(C) Total marketing cost (cost price)	10,850	100
(E) Marketing margin (profit)	3,650	
(A-C)		
(F) Marketing efficiency Index (M.E.I)	0.34	
(E/C)		

Source: Field Survey, 2017

The result for the Marketing Margin was estimated as ₦3650, this is an indication that millet grain marketing is relatively profitable business venture in the study area. Also, marketing efficiency index was estimated at 0.34, implying that the marketing of millet grains in the study area was at a low level of efficiency.

## Factors Affecting the Marketing Margin of Millet Grains

**Table 10: Factors Affecting Marketing Margin of Millet Grains**

Variable	Coefficient	Standard error	T-ratio
Constant	2.641**	1.012	2.609
Gender (X <sub>1</sub> )	0.355 <sup>n.s</sup>	0.289	1.225
Marital status (X <sub>2</sub> )	0.462 <sup>n.s</sup>	0.376	1.229
Experience (X <sub>3</sub> )	0.087**	0.032	2.673
Market information (X <sub>4</sub> )	0.254**	0.009	2.554
Quantity supplied (X <sub>5</sub> )	0.642**	0.229	2.8
Marketing cost (X <sub>6</sub> )	-0.488**	0.178	-2.74
R <sup>2</sup>	0.727		
F-ratio	7.985**		

Source: Field Survey 2017; \*\*= Significant at 5% (P<0.05) Level; N.S = Not Significant

The Ordinary Least Square (OLS) regression was used to determine the factors affecting the marketing margin of millet grains. The OLS regression was used to establish the effects of socio-economic characteristics of the respondents on the marketing margin of millet grains. The regression analysis (Ordinary Least Square) presented in Table 9 was used to determine the factors affecting the marketing margin (profit) of millet grains in the study area. The coefficient of multiple determination ( $R^2$ ) was estimated at 0.727 which implies that about 73% of the variation in the marketing margin of millet grains was accounted for by the variable inputs in the model. The F ratio (7.985) is significant at  $P < 0.05$  (5%) level, implying that the variables ( $x_i$ ) in the regression model accurately predicts the outcome variable ( $y_i$ ), hence, the independent variables significantly explained the variations in the marketing margin of millet grains. Therefore, the regression model is well fitted to the data, suggesting a linear relationship among the variables.

### **Marketing Experience ( $x_3$ )**

The coefficient of marketing experience (0.087) was positive and statistically significant at 5% level. Hence, the number of years a respondent spends in performing any marketing function directly influences their marketing experience and thus improved market margins (profit) over a time period.

### **Market Information ( $x_4$ )**

The coefficient of access to market information (0.254) was positive and significant at 5% level. This implies that traders with access to market information will have more supply chain networks and thus, receive higher margins compared to those that do not have any access to information. This result corroborates with the works of Ugwumba (2009) on Nigerian maize marketers.

### **Quantity Supplied ( $x_5$ )**

The coefficient of quantity supplied (0.642) was positive and significant at 5% level, implying that as more grains are supplied by the traders there will be an increase in the market margins accruable to them.. This result corroborates with the works of Ugwumba (2009) on Nigerian maize marketers.

### **Marketing Cost ( $x_6$ )**

The coefficient of marketing cost (-0.488) was negative but statistically significant at 5% level, implying that increase in the marketing costs decreases the marketing margin. Cost of millet marketing was high and thus policies aimed at reducing the marketing costs are necessary in order to increase the marketing margin of the traders. A similar finding of an inverse relationship between marketing costs and the marketing performance was noted with Nigerian maize market participants (Ayoola and Zever, 2010).

## Constraints Associated With Millet Marketing

**Table 11: Constraints Associated With the Marketing of Millet Grains**

Constraints	Frequency*	Percentages (%)
High marketing cost	50	83
Inadequate capital	55	91.7
Poor access to market information	15	25
Poor storage facilities	45	75
Low adoption of storage technologies	27	45
Poor market infrastructures	33	55
Lack of standardization/Poor grading	20	33.3
Price fluctuation	48	80

Source: Field survey, 2017; \*Multiple responses were allowed

Millet grain marketing in the study area has been associated with a number of problems. Table 11 shows the basic problems confronting Millet grain traders in the study area. The significant constraints identified by the respondents were inadequate capital (91.7%), high marketing cost (83%), price fluctuation (80%), and poor storage facilities (75%). Other constraints include; poor market infrastructures (55%), low adoption of improved storage technologies (45%), lack of standardization (33.3%), and poor access to market information (25%).

## CONCLUSION AND RECOMMENDATION

This study analyzed the economics of millet marketing at Katako market in Jos North Local Government Area of Plateau state, Nigeria. This study revealed that there is low level efficiency in the millet grain marketing system; the millet grain market is also concentrated; the socio-economic characteristics of the respondents had significant effects on marketing margin (profit); and several factors have been identified as constraints in millet grain marketing. It has been revealed from the study that marketing costs were relatively high, and there is a great need to reduce these costs. Based on the findings of this study, the following recommendations are made for policy actions to improve profitability and reduce marketing costs in millet grain marketing;

- i. The study recommends formation of group cooperative to forestall the high cost of transportation and storage to enhance profit margin among millet suppliers.
- ii. There is need for efficient linkages of all classes of millet market traders. Such policies might include formation of micro selling schemes, use of contract agreements and setting up of online marketing system to sensitize processors on the annual domestic production levels and supply sources.
- iii. Encouraging the adoption of millet processing technology at all levels.
- iv. Improvement of agriculture financial support.



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