



Original Research Article

Analysis of price spread, profitability and constraints to dry maize (*Zea mays*) marketing in Southeast, Nigeria

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The study examined seasonal price spread among of dry maize in Southeast, Nigeria; estimated the profitability of dry maize marketing; and identified constraints to dry maize marketing in the area. Multi-stage sampling method was used to select 225 respondents who were served with questionnaire to obtain primary data. Mean marketing margin and budgetary techniques were used to analyze the data. Per 100kg average peak season wholesale marketing margin of ₦ 1,799 for yellow maize was higher than that of white maize (₦1,331) while, retail marketing margin of (₦2,091) for yellow maize was higher than that of white maize (₦1,910). Per 100kg average lean season wholesale marketing margin of ₦2,230 was higher than that of white maize (₦823) while retail marketing margin of ₦2,147 for yellow maize was higher than that of white maize (₦2,030). Profitability indicators such as net marketing income, return on investment, net return on investment of ₦30,621,097.05, 1.6 and 0.6 for wholesalers of dry white maize, ₦30,481,997.03, 1.6 and 0.6 for wholesalers of dry yellow maize; ₦28,206,114.35, 1.7 and 0.7 for retailers of dry white maize and ₦29,867,917.35, 1.8 and 0.8 for retailers of dry yellow maize respectively, proved the business profitable. Constraints to dry maize marketing were high cost of transportation, inadequate capital, storage pests and diseases, high market levy, unstable prices, poor storage facilities, too many traders, inadequate market information and poor sales. The dry maize marketers should form corporative societies to enable them transact the business at minimal cost and earn higher profit.

Key words: Price spread, profitability, constraints, dry maize, Southeast.

INTRODUCTION

Maize (*Zea mays*), known in many English-speaking countries as corn, is a grain domesticated by indigenous people in Mesomari (Bulgaria) in prehistoric times. It is the most widely grown grain crop in the Americas with 322 million metric tonnes grown annually in USA alone (Raouf, 2011). It is an annual plant belonging to the grass family (*gramineae*) (Oluwatoyin, 2013). Maize is a cereal crop that is grown throughout the world in a range of agro-ecological environments. It was introduced into Africa in the 1500s

and has become one of the Africa's dominant food crops. Like in many other regions, it is consumed as a vegetable, although it is a grain crop (Singh et al., 2012). In Nigeria, output of maize has continued to increase, but its contribution to the Gross Domestic Product (GDP) is still low. Maize contributes about 80% of poultry feeds' ingredients with implications for protein intake in Nigeria (FAO, 2008). In terms of total production of cereals, maize is exceeded only by sorghum and millet (FAO, 2009). Some

of the attributes of maize are its low cost of production, high yield, significant investment returns, ease of processing and adaptability across agro ecological zones (IITA, 2009).

International Institute for Tropical Agriculture (IITA) (2010) opined that about 50 varieties of maize exist and are of different colours, textures, grain shapes and sizes. The white and yellow varieties are preferred by most people depending on the region.

In Nigeria, maize is a very important staple food crops. It is predominantly used as a separate food in the diet of urban and rural inhabitants. It also has vast commercial and industrial uses by agro-based industries through its processing and transformation into corn flakes, flour, baby foods, confectionaries, starch and livestock feeds and other products (Oyetoro and Okunade, 2012). Maize is equally useful in alternative medicine, chemicals, bio fuel, and ornamentals. Maize grains are rich in vitamins A, C and E, carbohydrates, and essential minerals, and contain 9% protein (Mboyal 2011; Gwirtz and Maris, 2013). It is also rich in dietary fibre and calories which are good source of energy (Mboyal, 2011).

Agricultural marketing is a form of marketing that encompasses all goods and services related to agriculture. These products will directly or indirectly support the effort to produce and deliver agricultural products from the farm to the consumer. It helps the producer such as the farmer and the middlemen to earn income with which they purchase other useful goods and services (Ebe, 2007; Ofoedu et al., 2017).

Dry maize marketing itself, is concerned with all the operation that aid movement of the product from the producer to the final consumer.

Addressing the challenges facing maize production and marketing is vital to the future of hundreds of millions of people in the world, and Nigerian in particular. Onuk et al. (2012) noted that despite the economic important of maize (dry maize) to the teeming populace in Nigeria, it has not been produced to meet food and industrial needs of the country. A greater percentage of dry maize marketed in the South Eastern States of Nigeria is imported from the Northern parts of the Country. This development might be the reason for soaring marketing costs incurred by the marketers, dwindling marketing efficiency, erratic inter market and seasonal price spreads and thus the poor and unsteady net marketing income realized by the marketers.

In many markets in Nigeria, price of dry maize is rising due to the high usage of the product; thereby widening the demand supply gap. This widening demand-supply gap can also be as a result of the existence of inefficiency in the marketing system due to marketing problems such as poor market information, poor market structure, high cost of transportation, lack of capital, poor storage facilities, limited markets and large number of intermediaries (Ebe, 2007, Ugwumba, 2009; Ugwumba and Okoh, 2010). This study was undertaken, therefore to provide information for

policy formation towards improved profitability and well-being of marketers of dry maize.

MATERIALS AND METHODS

The study area is Southeast geopolitical zone of Nigeria. The zone consist of five states; Abia, Anambra, Ebonyi, Enugu and Imo. It is bounded in the East by Awka Ibom and cross River States, in the North by Benue and Kogi States, in the West by Edo and Delta States and in the South by Rivers and Bayelsa States. The area is inhabited by the Ibo race and *Igbo* is the native language, though English is widely spoken and used as official language in governance. They are predominantly Christians and agriculture is the predominant occupation mostly in the rural areas. Dry maize marketing is a common enterprise in markets in the five constituent States of the zone. Both yellow and white dry maize are marketed by the marketing agents.

The zone lies between latitude 40 50¹N to 70 10⁰N and longitude 60 40¹E and 80 30¹E. It covers a total land area of 26,982.67km² representing 8.5% of the nation's total land area with a total population of 16,395,555 million (National Population Commission (NPC), 2006). The mean minimum and maximum temperatures range from 21°-30°C in the coast to 29°C - 35°C in the interior. The temperature is suitable for the production and marketing of dry maize.

Multistage and simple random technique were used to select 225 respondents for the study. Stage I involved random selection of 3 states (Anambra, Enugu and Imo) out of the 5 states in the Southeast, Nigeria. Stage II entailed random selection of 5 LGA, from the each of the selected States, thus making a total of 15 LGAs. They were, Enugu North, Enugu South, Udeenu, Nsukka and Ude in Enugu State; Ihiala, Aguata, Nnewi North, Onitsha South and Onitsha North in Anambra State; and Owerri North, Owerri Municipal, Ezinifite, Oru West and Orlu in Imo State. At stage III, one daily market was purposively selected from each of the 15 L.G.A areas to arrive at 15 daily markets for the study. The markets were identified by a reconnaissance survey on size, strategic locations, daily nature and number of intermediaries selling dry maize in the area. Finally, at stage IV, simple random method was used to select five wholesalers and ten retailers from each of the selected markets to arrive at a sample frame of 225 respondents. Primary data were obtained using structured questionnaire administered through personal interview. Data were collected on revenue and cost variables, product price, seasonal price spread, as well as constraints to dry maize marketing. Marketing margin technique was used to analyze data generated for seasonal price spread. Profitability of dry maize marketing was achieved using budgetary technique, while constraints to dry maize marketing was realized using means. Responses on constraints to dry maize marketing were disaggregated as follows;

Table 1. Peak season wholesale mean marketing margin of dry maize grains (N/100k bag)

State	Yellow maize			White maize		
	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin
Anambra	14,104	14,700	596	13,340	14,340	1000
Enugu	13,520	15,700	2,180	13,156	14,568	1,412
Imo	13,960	16,580	2,620	13,860	15,440	1,580
South east	13,861	15,660	1,799	13,452	14,783	1,331

Source: Field survey, 2016.

Table 2. Peak season retail mean marketing margins of dry maize grains (N/100k bag)

State	Yellow maize			White maize		
	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin
Anambra	14,700	16,960	2,260	14,340	16,540	2,200
Enugu	15,700	17,674	1,974	14,172	15,602	1,430
Imo	16,420	18,460	2,040	15,440	17,540	2,100
South east	15,606	17,698	2,092	14,651	16,561	1,910

Source: Field survey, 2016.

Very serious = 4, Serious = 3, moderately serious = 2, and not serious = 1. Determination of cut-off point, $X =$

$$\frac{\sum f}{n} = \frac{4+3+2+1}{4} \frac{10}{4} = 2.5$$

To make inferential statement, the mean score was compared with that of critical mean of 2.50. If the calculated mean of the problem was greater than the standard critical mean, then the problem was regarded as very serious.

The marketing margin model (Ugwumba and Nwankwo, 2013) used to examine the seasonal price spread among the intermediaries is specified as:

$$MM = SP - CP$$

Where

MM = Marketing Margin

SP = Selling Price

CP = Cost Price

The budgetary technique was adopted by Ugwumba (2009, 2010 and 2011); Ugwumba et al.(2012), in the determination of enterprise profitability. The technique is specified as:

$$NMI = \sum_{i=1}^n P_{yi} Y_i - \left(\sum_{k=0}^n P_{xij} X_{ij} + \sum_{i=1}^r F_{ij} \right)$$

Where:

NMI/Profit = Net Marketing Income /Profit

\sum = Sum

$P_{yj} Y_j$ = Unit price x quantity of j^{th} respondent's sales = total revenue (TR) for j^{th} respondent.

$P_{xij} X_{ij}$ = Prices x quantities of j^{th} respondent's variable

inputs = total variable cost (TVC) for j^{th} respondent.

F_{ij} = Depreciation values of equipment, annual rent for store, interest on loan, e.t.c. for j^{th} respondent = Total fixed cost (TFC) for j^{th} respondent.

TC = Total cost (TVC + TFC).

RESULTS AND DISCUSSION

Seasonal price spread among the intermediaries

Tables 1 and 2 show the peak season price spread per 100kg bag for the wholesalers and retailers of yellow and white maize in the area. The peak season wholesale mean marketing margin per 100kg bag of yellow maize was ₦1,799 while that of white maize was ₦1,331. This implied that the margin was greater for yellow maize than white maize due to its preference by many people because of the colour of its by-products. The average marketing margin (₦2,092) of yellow maize was greater than that of white maize (₦1,910) among the retailers. This could also be traced to the issue of higher demand and consumer price of yellow maize than white maize in the area due to its preferred colour. Mbuki and Fitche (2013), identified a larger price spread in maize marketing, in markets in Zaire.

Tables 3 and 4 contain information on the lean season wholesale and retail marketing margin and show that the margin was higher for yellow maize (₦2,230) than white maize (₦833). On the other hand, the retailers of yellow maize in the Southeast realized higher lean season mean

Table 3. Lean season wholesale mean marketing margin of dry maize grains (N/100kg bag)

State	Yellow maize			White maize		
	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin
Anambra	15,000	17,100	2,100	14,440	15,100	660
Enugu	14,700	16,510	1,810	14,810	15,400	590
Imo	14,320	17,100	2,780	14,330	15,580	1,250
South east	14,673	16,903	2,230	14,526	15,360	833

Source; Field survey, 2016

Table 4. Lean season retail mean marketing margin of dry maize grains (N100kg)

State	Yellow maize			White maize		
	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin	Mean Purchase Price	Mean Selling Price	Mean Marketing Margin
Anambra	17,100	19,100	2,000	15,100	16,970	1,870
Enugu	16,510	18,500	1,990	15,400	17,210	1,810
Imo	17,700	17,700	2,450	15,580	17,990	2,410
South east	16,903	18,433	2,147	15,360	17,390	2,030

Source: Field survey, 2016.

marketing margin of (N2,147) than that made from white maize (N2,030). This development could be traced to consumers' preference of yellow coloured to white coloured by-products of dry maize.

Profitability of dry maize marketing in the area

The estimated monthly profitability of dry maize is shown in Table 5. For the wholesalers, white dry maize grains generated gross margin of N31,721,342.5 and net marketing income of N30,621,097.05, while yellow dry maize grains earned the marketers gross margin and net marketing income of N31,582,242.5 and N30,481,997.05 respectively. Further result of the analysis recorded net return on investment of 0.6 for dry white maize and 0.6 for dry yellow maize. This meant that the two types returned N0.6 for every N1.00 spent by the marketers during the marketing period. By implication, the two maize types produced positive net returns on investment for the market to make dry maize marketing profitable business in the area. Ugwumba (2009) reported that maize marketing was profitable in Anambra State.

Further result of the analysis as recorded on the retail side, generated gross margin of N28,693,104.5 and net marketing income of N28,206,114.35 for dry white maize grains retailers, while dry yellow maize grains earned the retailers gross margin and net marketing income of N30,354,907.5 and N29,867,917.35 respectively. Further result recorded net return on investment of 0.7 for dry white maize grains and 0.8 for dry yellow maize grains, meaning that the dry white maize returned N0.7 for every

N1.00 spent while dry yellow maize grains earned the retailers N0.8 for every N1.00 spent. By implication, the marketing of dry yellow or white maize grains was profitable. However, dry yellow maize grains returned more net marketing income than dry white maize grains for the retailers. The reason could be that most of the consumers who made purchases directly from the retailers preferred dry yellow maize grains to the white ones. Studies by Nwosu (2003), Onu and Iliyasu (2008) and Obasi et al. (2012) attested to the good profits earned by dry maize marketers in Imo, Adamawa and Abia State respectively.

Constraints to dry maize marketing

The marketing of dry maize in the southeast was affected by some problem. It could be seen from Table 6 that high cost of transportation ranked first to become the most serious problem encountered by the wholesalers (M=2.86) of dry maize in the area. This is in line with the findings of Obasi et al. (2012) that transportation is the most critical factor affecting marketers and their performance in many developing countries. This is basically attributed to bad road network which characterizes the area. The transportation problem was closely followed by inadequate capital (M= 2.63), storage pests and diseases (M= 2.60), high market levy (M= 2.55), poor and unstable prices, poor storage facilities and too many other trades (M= 2.50 in each case), inadequate market information (M= 2.36) and the least poor sales (M= 2.30).

Further results on the retail side (Table 7), indicated that

Table 5: Profitability of dry maize marketing according to intermediaries in Southeast Nigeria

Parameter	White maize			% of TC	Yellow Maize			% of TC
	Wholesaler	Retailer	Total		Wholesaler	Retailer	Total	
Total Revenue	79,506,550	64,514,430	144,020,980		78,587,650	64,227,664	142,815,314	
Variable costs								
Purchases	45,349,300	35,142,030	80,491,330	94.4	44,569,500	33,193,461	77,762,961	94.2
Loading	438,582.5	202,455	641,037.5	0.75	438,582.5	202,455	641,037.5	0.75
Off-loading	224,000	91,410.5	315,410.5	0.37	224,000	91,410.5	315,410.5	0.37
Association dues	9,325	4,260	13,585	0.01	9,325	4,260	13,585	0.01
Transportation	1,692,275	337,065	2,029,340	2.38	1,692,275	337,065	2,029,340	2.38
Miscellaneous	71,725	44,105	115,830	0.13	71,725	44,105	115,830	0.13
Total variable cost (TVC)	47,785,207.5	35,821,325.5	83,606,533	98.1	47,005,407.5	33,872,756.5	80,878,164	98.0
Gross margin (TR-TVC)	31,721,342.5	28,693,104.5	60,414,447		31,582,242.5	30,354,907.5	61,937,150	
Fixed costs								
Annual shop rent	974,518	361,131	1,335,649	1.56	974,518	361,131	1,335,649	1.61
Wheel barrow	47,299.8	31,796.15	79,095.95	0.09	47,299.8	31,796.15	79,095.5	0.09
Interest on loan	56,175	80,258	136,433	0.16	56,175	80,258	136,433	0.16
L.G.A charges	22,252.65	13,805	36,057.65	0.42	22,252.65	13,805	36,057.65	0.42
Total fixed cost (TFC)	1,100,245.45	486,990.15	1,587,235.6	0.04	1,100,245.45	486,990.15	158,7235.6	0.04
Total cost (TVC+TFC)	48,885,452.95	36,308,315.65	85,193,768.6	100	48,105,652.95	34,359,746.65	82,465,399.4	100
Net marketing income (GM-TFC)	30,621,097.05	28,206,114.35	58,827,211.4		30,481,997.05	29,867,917.35	60,349,914.4	
Return on Investment	1.6	1.7			1.6	1.8		
Net return on Investment NMI	0.6	0.7			0.6	0.8		
Mean ^{NMI} / _n	408,281	188,040			406,426	199,850		

Source, Field survey, 2016

Table 6. Problems of dry maize grain marketing by (Wholesalers) in the area

Parameter	Mean score	Rank
General marketing problems		
High cost of transport	2.86	1 st
Inadequate capital	2.63	2 nd
Storage/pest/diseases	2.60	3 rd
High market levy	2.55	4 th
Poor and unstable prices	2.50	5 th
Poor storage	2.50	5 th
Too many other traders	2.50	5 th
Inadequate market information	2.36	6 th
Poor sales	2.30	7 th

Table 7. Problems of dry maize grain marketing by retailers in the area

Parameter	Mean score	Rank
General marketing problems		
Poor and unstable prices	2.71	1 st
High market levy	2.71	1 st
Storage/pest/diseases	2.61	2 nd
Too many other traders	2.55	3 rd
Inadequate capital	2.47	4 th
Poor storage	2.40	4 th
High cost of transport	2.40	5 th
Inadequate market information	2.36	6 th
Poor sales	2.30	7 th

poor and unstable prices and high market levy were the most serious marketing problems of the retailers with mean score of 2.71 each. The second in rank was storage pests and diseases (M= 2.61), then too many other traders (M=2.55), inadequate capital (M=2.47), high cost of transportation and poor storage facilities (M=2.40 in each case), inadequate market information (M= 2.36), and poor sales as the weakest problem (M=2.30). Ayoola and Azever (2010), Kwadzo and Scrofenyoh (2012), and Babatunde and Oyotoye (2006) identified transportation problems, inadequate capital, and poor storage facilities as serious constraints to maize marketing in the different study areas.

CONCLUSION

Dry maize grains marketing proved a profitable enterprise at both the wholesale and retail levels in Southeast Nigeria. The marketing margins realized by marketers of yellow maize were higher than those earned by marketers of white maize due to its preference by most consumers because of the colour of its by-products. Addressing the constraints identified by this study, especially the serious ones such as high cost transportation, inadequate capital, poor and unstable prices, and poor storage facilities through sound policy measures would improve marketing efficiency, profitability and overall welfare of the marketers.

RECOMMENDATIONS

- i. Government should provide necessary transportation facilities such as good network of roads and mass transit vehicles so as to ameliorate the transportation problems of the marketers, improve marketing efficiency and net marketing income realized by the marketers.
- ii. Government and other concerned agencies should cooperate in building market infrastructures, especially new model markets, stores, conveniences, borehole and refuse dumps in order to ensure good health of the marketers, reduce marketing cost and improve enterprise profitability.

- iii. The dry maize grains marketers should form cooperative societies, which have proven to be the best way of obtaining subsidies, credit facilities and group contributory efforts.

Conflict of interests

The authors declare that they have no conflicting interests

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