EVALUATION OF MARKET STRUCTURE AND EFFICIENCY OF GUM ARABIC MARKETERS IN NORTH-EASTERN NIGERIA

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ABSTRACT

Gum arabic is one of the economic tree crop commonly found in Sahelian and Savannah of tropical zones. There are over 1100 different species of the plant. Three of these are of economic value due to the role they play in manufacturing industries worldwide. Nigeria earned total revenue of $121 million US dollars from the export of gum arabic (Aliyu, 1998, Umar, 2006). This made many gum arabic growing states in Nigeria to embark on elaborate production of gum arabic, being the '*gold of the desert*' as sometimes called. The study evaluated market structure and efficiency of gum Arabic marketers in north – eastern Nigeria. Data were collected through the use of structured questionnaire administered on randomly selected 150 respondents in Adamawa, Taraba and Yobe states. Descriptive statistics like means, percentage and frequency were employed to analyse the socio-economic variables of the respondents; while Gini-Coefficient and Okeke and Awotide models were used to evaluate the market structure and marketing efficiency of the gum arabic marketers respectively. The results revealed that majority (57.33%) of the respondents had gum Arabic marketing experience of 21 years and above; 65% had no formal education. The average marketing efficiency recorded was 59.14%, implying an average inefficiency of 40.86% which is high. The market structure analysis showed that the buyer – seller of gum arabic concentration in the study area was 0.812, which is close to unity (1) implying that revenue was almost equally distributed. Technically however, there was great variation in the revenue generated as out of the 150 gum arabic marketers considered in the study, only 27 (18%) accounted for ₦387,279,930.00 which indicates 98.6 % of the total revenue generated, while the remaining 123 respondents (82%) contributed only ₦ 5,498,214.82, which was just 1.4% proportion of the total revenue. This implies that the gum arabic marketing in the area was principally played by only18% of the total respondents; there was no fair equality in revenue distribution among the respondents.

Keywords: Market structure, Gum Arabic, Market efficiency, North – eastern Nigeria.

INTRODUCTION

Nigeria is blessed with abundant human and natural resources, yet insufficiency of food, poor shelter and other forms of poverty indices such as inadequate clean drinking water and poor health facilities dominates her communities. This could be due inferiorism Nigerian Government showed to agriculture. For instance, just two decades after the discovery of oil in the country, the food growth rate in Nigeria declined to 1.2%, while the population growth and food demand rates were 3.2% and 3.5% respectively (Enwere 1991). This gave a food supply deficit of 2.3%. In the same vein, the agricultural share of Nigeria's Gross Domestic

Product (GDP) fell from 60 percent in the 1960s to 40 percent in 2008 (Ruma, 2008);which implies deficit in the domestic supply of food in the country.

Agricultural Marketing is an important means for development, especially for the developing countries. According to Zendillo (2008), production and marketing has significantly helped in overcoming poverty in most developed countries like USA, UK, Japan, Indonesia, China and Brazil. Meanwhile Nigeria being an agrarian community is expected to take advantage of her abundant resources (gum arabic inclusive) to employ them in the most needed programmes for development and poverty alleviation among her people. Unfortunately, in addition to government poor attitude in developing agriculture, the exchange rate volatility on non – oil export goods from Nigeria is worrisome. Kiptui (2007) and Aliyu (2008) reported that there is high speedy rate of volatility of Nigerian currency in short – run with little adjustment towards equilibrium path in the long – run. Nigeria though second to Sudan in the supply of gum arabic in the World market, there exist a wide gap of about 60 to 70% in supply despite the high potentials of gum arabic production and marketing in the country (Umar, 2006). For instance, Nigeria has about 98 million hectares of land, but only about 44 million hectares is cultivated, leaving about 54 million hectares uncultivated (Oyedipe, 2001), this is under utilization of land resources. According to Giroh, Igbinosum and Umar (2007), large part of this vast uncultivated land is in the northern part of the country; where Gum arabic plants are abundantly growing wild in about eleven states which is expected to give the region a comparative advantage in production and marketing of the produce.

Gum arabic belts of Sub – Sahara Africa supplies the world major Gum Arabic produce (Raw Materials Research and Development Council, 2004). Nigeria is second to Sudan in the world production and marketing of gum arabic with a current production figure of about 7000-8000 metric tonnes per annum (Nnamdi 2010). This accounted for 10% of the world supply. Nigeria earned total revenue of $121 million US dollars from the export of gum arabic (Aliyu, 1998, Umar, 2006). This made many gum arabic growing states in Nigeria to embark on elaborate production schemes of gum arabic, being the '*gold of the desert*' as sometimes called.

LITERATURE REVIEW

Market Structure: This refers to the degree of buyers and sellers concentration as well as the degree of product differentiation and the market accessibility/barrier. It essentially deals with the organizational relationship among the buyers and sellers. Market structure looks at the chain and the number of business partners in transaction of a particular commodity from the point of production to the final consumer. This has direct influence on the rate/level of revenue distribution among the marketers of the same produce in the same locality.

Marketing Conduct: This refers to the patterns of behaviour exhibited by the buyers and sellers during a business transaction purposely to optimize their business activities (Wood, 2008). Marketing conduct is therefore one of the factors considered in evaluating marketing efficiency as it takes into account the following behaviours:

   (i) Methods of price and quantity determination,
   (ii) Methods of produce/product selling promotion policies, and
   (iii) The tactical methods of exclusion/barrier for others into the market.

With regard to gum arabic marketing in Nigeria, the market conduct is generally seemed to be exploitative of the farmers by the middlemen. The produce price determination and the selling promotion policies are highly in the hands of buyers (Umar, 2006). These tactically created barriers to the poor resource marketers from actively participating in exporting the produce (gum arabic).

Marketing Performance: Maurice and Philips (1989) defined marketing performance as the assessment of the marketing activities of a produce/product. It takes into account how well the marketing processes are carried out and how successful they are accomplished. This implies that marketing facilities such as processing equipments, storage facilities, transportation, grading and standardization need to be evaluated in order to determine the marketing performance of a produce/product as these influence quantity, quality, time and price of the product to the consumers. The marketing performance can therefore be regarded as efficient when goods are produced, processed, assembled, transported, and delivered to the final consumer as at when due, and at the price they can afford for the produce in form and quantity they want. In summary, it is a function of market structure and conduct.

Marketing Efficiency: Kal Pearson, 1905 marketing efficiency theory as cited by Rangasamy and Dhaka (2008) associated the concept with 'Random walk model'. The theory states that if the drunk can be expected to stagger in a totally unpredictable random movement, he is likely to end closer to where he was than to any other place. Fama, 1970 as adopted by Rangasamy and Dhaka (2008) thus opined that the fluctuating nature of prices of commodities due to many factors, need to be observed, analyzed and measured for efficiency estimate or else the natural fluctuation of prices will pose a major challenge in trying to predict future path of prices.

The measure of Efficiency begins with Debreu and Koopmans, 1951 and Farrell, 1957 as adopted by Ogundari and Ojo (2005). Marketing efficiency is usually defined differently to suit one's conception. For instance, farmers see marketing efficiency as selling of their goods at the highest price, while the consumers consider marketing efficiency as getting their commodities at the lowest price. On the other hand, middlemen see it as the process of making high profit. However, Giroh, Waizah and Umar (2010) observed that if farmers' prices are too high, it will limit consumers' purchasing power which will in turn affect farmers' future production. They therefore defined agricultural marketing efficiency as the movement of agricultural commodity from the producer to the consumer at the lowest cost possible consistent with the provision of the services that consumer is willing and able to pay for. There are two types of Marketing efficiency; namely technical efficiency which is the measure of the ability of the marketer to obtain maximum output from a given set of inputs, and the allocative efficiency which refers to ability of the marketer to use the inputs in optimal proportions given their respective prices. The two measures provide a total economic efficiency. According to Rangasamy and Dhaka, mathematically agricultural marketing efficiency is the ratio of value addition for goods to their marketing cost, while the value added is the difference between the farm gate price and the retail price.

Gum Arabic Marketing in Nigeria: The local market for Gum arabic in Nigeria started since 1914; with the first gum arabic market centers located in Geidam and Damaturu both in Yobe state (Baseline Survey on Gum arabic, 202). This was initiated by the then Northern Provence Governor, Mr. Howbey R. Palmer who visited Sudan and saw how Gum arabic business was thriving. Immediately he came back to Nigeria he ordered for sample collection of similar produce in Nigeria and sent it to Premier Institute, London for analysis. The result

revealed that the produce was similar to that found in Sudan. It is unfortunate that since then the gum arabic market in Nigeria has been unregulated as its farm gate price is quite unstable. Farmers/collectors of gum arabic have no specific market location or union. Only the middle men purchasing gum arabic that have distinct markets and unions (Umar, 2006). The price for raw gum arabic varies from state to state and season to season as shown in Appendix 5. However; the local market structure for gum arabic seems to assume same shape with that of the international one. Thus, grade 1 gum arabic (*Acacia senegal*) which is most patronized is usually processed in to powder form by the only local processing industry in the country, (DANSA FOODS) Company located in Kano to add value. RMRDC (2004) also reported that due to some factors which include irregular supply of the product, gum arabic is always short of its demand of the local industries in Nigeria. This led Nigeria to import about 129,550 kg refined gum arabic in just 2001 at a total cost of ₦ 39.64 million. This amount would have been saved if the local processing industries of gum arabic are encouraged.

Export Market for Gum Arabic in Nigeria: Nigeria is the second largest producer and marketer of gum arabic in the world after Sudan which produces a total estimate of about 18,000 metric tonnes per annum (RMRDC, 2004). However, according to Ligali (2005), there was an attractive increase on gum arabic price in Nigeria domestic market to about ₦ 25, 000.00/50 kg in 2005.

METHODOLOGY

Study Area: The study was carried out in Adamawa, Taraba and Yobe States of North-Eastern Nigeria. Geographically, the states are in Semi-Arid zone with a mean annual rain fall of 160.2 mm, and temperature fluctuating between 14°C to about 44°C (Yobe State Diary, 2000). These conditions promote the production of gum arabic (Aghughu, 2004). There are diverse ethnic groups well over 50 different tribes found in these states with major languages spoken as Hausa, Fulfulde, Kanuri, Kilba, Margi, Bura Bachama, Chamba and Fali among others. Figure 2 presents map of Nigeria showing areas where gum arabic is produced and as well as the study area.

Data Source and Collection: Primary data were used for the study. The data were collected through the use of questionnaire administered through oral interviews on gum arabic marketers in the study area. The questionnaire was designed to solicit information on the benefits (income) generated by the respondents from the sales of gum arabic, value of assets before and after engaging in gum arabic marketing which were used to evaluate the degree of poverty alleviation among the respondents as well as the constraints they face in the business of gum arabic.

Methods of Data Analyses: Descriptive statistics such as mean, percentages and frequency distribution were used in analyzing the socio economic variables in the study, while Gini – coefficient model was used to evaluate the gum arabic market structure, Lothains and Okeke and Awotide models were adopted to determine the N - $ exchange effects and gum Arabic marketing efficiency of the marketers respectively in the study.

Market Structure Analysis: Gini – coefficient was employed to measure the degree and level of revenue/income distribution among gum arabic marketers in the study area. Gini-coefficient model was initiated by Kunznets Simon, 1955 where he used it to measure inequality in income shares among countries – India, Ceylon, United Kindom and United State of America.

Gini-coefficient values range from 0-1. The closer the value of Gini-coefficient result to unity, the more equality of the distribution among the respondents. This reflects the degree of buyers and sellers concentration in the gum arabic business; and thus measures the gum arabic market structure (Umar, 2006). The Gini – coefficient formula is given as:

  GC = 1- ∑XY; --- 1
        Where:
        GC = Gini-Coefficient
X = the percentage of sellers in the category
Y = cumulative percentage of total sales, and
∑ = summation sign.

Measurement of Gum arabic Marketing Efficiency: The gum arabic marketing efficiency in the study area was evaluated using the model of Okeke and Awotide, 1986 as adopted by Awotide *et al.(* 2007). According to Okeke and Awotide, price efficiency (PE) can be measured as

$$PE = \frac{PU}{CU} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .2$$

Where:
PU = retail price of gum arabic (₦)
CU = traders unit price of gum arabic (₦)
     Result from equation 1 will help to infer the level of market margin that exist between the gum arabic farm gate price and the price offered by middlemen in the study area. Thus, Awotide *et al.(* 2007) stated that the overall Marketing efficiency/Economic efficiency (ME) can therefore be determined as:
ME = <u>net marketing margin </u>x 100   --- 3
        Marketing cost
Equation (3) implies that the higher the percentage value, the more efficient the gum arabic marketing is (Awotide *et al* 2007). The result obtained from these equations (2 and3) aided in explaining whether or not the gum arabic marketers in the study areas were efficient in their marketing activities.

RESULT AND DISCUSSIONS

Age: The age distribution of the respondents is presented in Table 1. The result shows that only 1.33% of the gum arabic marketers were either 20 years or less than. Those with ages of 41 - 60 years constituted 56.66% of the total respondents. The respondents' mean age was 53 years. This indicates that gum arabic marketing in the study area was dominated by middle age people. The reason may be due to the laborious nature of the processes involved in gum arabic marketing such as moving from village to village searching for the produce, careful sorting according to grades, shade drying of the produce and bagging.

Table: 1: Age distribution of the Respondents

Age (Years)	Frequency	Percentage (%)
≤ 20	2	1.33
21 – 30	12	7.33
31 -40	6	4.00
41 -50	41	27.33
51 – 60	44	29.33
61 - 70	41	27.33
71 and above	5	3.33
Total	**150**	**100.00**
Mean	**53 (years)**	

Source: Field survey, 2012.

The youth usually don't have the patience to undergo these processes, which agrees with the findings of Adigun, Awoyemi and Omonona (2011) who said that older/Middle Ages persons usually have higher ability of patience, and patience in business influences higher gains for the entrepreneur. The result can also infers that the middle age people in the study area were willing to bear the possible risk in the business, while the young ones were of risk averters in the business. This is in line with the finding of Giroh, Umar and Yakub,(2010) who reported that middle age people have relatively higher degree of risk bearing than the young people in agricultural business.

Gum arabic Marketing Experience: Table 2 depicts the years of experiences of the respondents' in gum arabic marketing. Most of the respondents (57.33%) indicated that they have been in the business for twenty one years and above. Only 6% of the respondents were new in the business of gum arabic (1 – 5 years). Those with 6 - 20 years experiences constituted 42.66% of the total respondents. The gum arabic marketers were thus expected to be efficient based on their long stay in the business as Wood, (2008) stated in his study on measuring experience that the greater impacts of marketing objectives are gained through experiences. Thus experience may serve as a useful factor in determining the effectiveness of marketing events among marketers (Wood, 2008). This is due to the fact that experience creates behavioural confidence in the business and increases buyers – sellers' engagement and stronger relationship.

Table 2: Distribution of Experience in Marketing of gum arabic by the Respondents

Marketing Experience (Years)	Frequency	Percentage (%)
1 – 5	9	6.00
6 – 10	17	11.33
11 – 15	21	14.00
16 – 20	17	11.33
21 and above	86	57.33
TOTAL	**150**	**100.00**
Mean	**18 (years)**	

Source: Field survey, 2012.

Educational status: The educational status of the respondents (Table 3) revealed that most of the marketers (64.67%) did not have formal education. There was only 1.33% had tertiary

education. The age spent in formal school by the respondents was 8.8. This does not cover up to completion of secondary education. It thus indicates a high level of illiteracy among the gum arabic marketers. This conforms to the findings of Eboh (2006) who said that literacy rates have deteriorated to about 30 % in Nigeria since 1991.

The implication of this high illiteracy among the respondents would be poor management of the gum arabic businesses as education is a crucial factor to the quality and performance of entrepreneurship. This explains the fact that despite the abundance of gum arabic in the area as well as its high demand worldwide, poverty prevails among the larger population (70%) in North – Eastern Nigeria (Eboh, *et al.* 2006).

Table 3: Educational Distribution of the Respondents

No. of years spent in Formal school	Frequency	Percentage (%)
(0)	97	64.67
(1 – 6)	30	20.00
(7 - 12)	21	14.00
(13 - 17)	2	1.33
Total	**150**	**100.00**
Mean (Years)	**8.8**	

Source: **Field survey, 2012.**

Market Structure: The gum arabic market structure in the study area was analyzed using Gini –Coefficient model (Table 4). The variation in revenue generated among the respondents revealed that a total of   ₦392,729,630.00 was generated among the 150 gum arabic marketers. Six (6) respondents had sales ranges from ₦1.00 -   ₦ 15,000.00, and had contributed only ₦13,600.00 of the total revenue generated, which indicates a proportion of 0.0035%. On the other hand, 27 respondents had sales ranges of ₦ 575,000.00 and above, and contributed ₦387,279,930.00 to the total revenue generated (98.6%). The Gini – Coefficient calculated was 0.812, which is close to unity (1). Mathematically, it implies that there was very low variation of sales and revenue generated among the respondents as 0.812 is close to 1(value of equal distribution). Technically however, there was great variation in the revenue generated as out of the 150 gum arabic marketers considered in the study, only 27 (18%) accounted for ₦387,279,930.00 which indicates 98.6 % of the total revenue generated, while the remaining 123 respondents (82%) contributed only ₦ 5,498,214.82, which was just 1.4% proportion of the total revenue. This implies that the gum arabic marketing in the area was principally played by only18% of the total respondents. Many factors could have been responsible for this.

The inability of most of the gum arabic marketers in the study area to have adequate fund could be the strongest reason, as capital is the most essential factor in marketing. This implies that there was monopoly of the business by the richer respondents as majority didn't play actively in the business.

Table 4: Market Structure Analysis using Gini – Coefficient model

Sales rage (₦)	No. of Sellers	Prop. of Sellers (X)	Cum.Prop of Sellers	Total value of Sales (₦)	Prop. of total sales (₦)	Cum.Prop of total sales (Y)	XY
1.00 - 15000.00	6	0.040	0.040	13,600.00	0.000035	0.000035	0.0000014
15001- 50,000	15	0.100	0.140	131,500.00	0.00034	0.000375	0.0000375
50001- 85000	18	0.120	0.260	338,000.00	0.00086	0.001235	0.000148
85001- 120000	17	0.113	0.373	508,000.00	0.0013	0.002535	0.0002865
120001- 155000	10	0.067	0.440	407,600.00	0.00104	0.003575	0.0002395
155001- 190000	8	0.053	0.493	328,000.00	0.00084	0.004415	0.0002340
190001- 225000	7	0.047	0.540	210,000.00	0.00054	0.004955	0.000239
225001- 260000	12	0.080	0.620	494,000.00	0.00126	0.006215	0.000497
330001- 36500	10	0.067	0.687	690,000.00	0.00176	0.007975	0.000534
65001- 400000	6	0.040	0.727	400,000.00	0.00102	0.008995	0.0003598
540001- 575000	14	0.093	0.820	1,929,000.00	0.0492	0.058095	0.005403
> 575,000	27	0.180	1.000	387,279,930	0.986	1.000	0.1800
Total	**150**	**1.00**	**1.00**	**392,729,630.00**	**1.00**	**1.00**	**0.188**

Using the formula, Gini-Coefficient (GC) = 1 - $\sum$ XY, GC = 1 - 0.188 = **0.812.**

Marketing Efficiency of the Gum Arabic Marketers: Table 4 depicts the analysis for marketing efficiency of gum arabic markets in Adamawa, Taraba and Yobe States.

Table: 5: Determination of Marketing Efficiency of the gum arabic Marketer in the study areas

(1) Market site	(2) Farm gate Price (₦/Kg)	(3) Selling Price (₦/Kg)	(4) Marketing cost (₦)	(5) Marketing margin (₦) (3 – 2)	(6) Net marketing margin (₦) (5 – 4)	(7) Marketing efficiency (%) (6 /4X 100)
Yobe State:	10,102.77	981,817	1460377.3	971,714.62	525,676.89	35.90
1. Babbangida	2,025.53	109,093.79	61,854.46	107,068.37	45,213.91	73.10
	24,246.64	218,187.59	224,726.1	193,940.95	111,514.85	49.62
2. Damaturu	**27284.94**	**1112728.77**	**1691287.86**	**1166723.94**	**682405.65**	**158.62**
	9094.98	**370909.59**	**563762.62**	**388907.98.**	**227468.55**	**52.87**

3.Bidda						
Sub –	17,174.70	218,183.13	118,715.31	201,008.43	82,293.12	69.32
Total	25,256.91	327,274.69	168,180.02	302,017.78	133,837.76	79.58
Average	30,308.29	327,274.69	258,287.07	326,966.4	168,679.33	65.31
Adamawa	**72739.90**	**872732.51**	**545182.4**	**829992.61**	**384810.21**	**214.21**
State	**24246.63**	**290910.84**	**181727.47**	**276664.20**	**128270.07**	**71.40**
1.Numan						
2.Kpasham	20,458.09	120,651.66	6,215.21	27908703.45	27811620.90	89.78
3.	15,911.85	157,273.50	118656.45	21204247.32	21085590.87	89.38
Ngbalang	7,273.99	157,273.50	118656.45	21204247.32	21085590.87	89.38
Sub –	**43643.93**	**293648.66**	**106423.11**	**391554.73**	**57159.28**	**159.46**
Total	**14547.98**	**97882.89**	**35474.37**	**130518.24**	**19053.1**	**53.15**
Average						
Taraba						
State						
1.Jalingo						
2.Lau						
3.						
Mayolope						
Sub –						
Total						
Average						
Grand	**143,668.77**	**2,279,109.94**	**2,342,893.37**	**2,388,271.28**	**1,124,375.14**	**532.29**
Total	**15,963.20**	**253,234.44**	**260,321.49**	**265,363.47**	**124,930.57**	**59.14**
Average						

Source*:* Calculated from field survey data, 2012

This could be associated with the fact that most of the respondents (57.33%) had more than 21 years experience in the business of gum arabic; which agrees with Wood (2008) who stated that experience is a useful factor in determining effectiveness of an entrepreneur in a business.   The average inefficiency rate of 40.86% (100 – 59.14%) recorded could be due to some errors in the operation activities, since marketing efficiency is a function of pricing and other operational activities. It thus implies that the other factors, (probably in the allocation of variable inputs and fixed inputs in the business) were not optimally allocated, hence the deviation from 100% efficiency as shown in Table 4. The study revealed an average of 59.14% as the marketing efficiency. Marketing efficiency of marketers is a good yardstick for measurement of the marketing performance (Awotide, *et al*. 2007). That is, the higher the values the more profitable the business is. It thus suggests that gum arabic marketing is profitable in the area.

SUMMARY AND RECOMMENDATIONS

SUMMARY

The study examined the market structure and the marketing efficiency of the respondents. The results revealed that people between the ages of 41 – 70 dominated the gum arabic marketing in the area. Also, 57.33% of the respondents had gum arabic marketing experience of 21 years and above and most of them (65%) had no formal education. A total of ₦ 392,729,630 was realized as revenue from the sales of 626,465.00 Kg in the area with Gini –

Coefficient value of 0.812. This shows high level of equality distribution of the revenue among the respondents. This was so because only 27 people among the respondents accounted for 98.6% of the total revenue; meaning the remaining 123 people didn't actively per took in the business of gum arabic in the area. The average marketing efficiency value of the respondents was 59.14%. This implies that the marketers were not optimally efficient in the business of gum arabic.

RECOMMENDATIONS

The marketers should try to source for financial support especially from Nigerian Bank of Industry to enhance their financial status in the marketing of gum Arabic rather than just leaving the business to only few individuals while the business is profitable. To improve on their marketing efficiency, they should adopt the principle of proper resources allocation in the business.

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