ANALYSIS OF MARKETING STRUCTURE AND NET MARGIN OF FRESH MANGO FRUITS IN MINNA METROPOLIS OF NIGER STATE, NIGERIA

[1]Ndanitsa, M.A; [1]Mohammed T. and [2]Ndako, N.
[1]Dept. of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Nigeria
[2]Dept. of Geography, School of Arts and Social Sciences, Niger State College of Education, Minna, Nigeria
Corresponding Author: Email: attahirundanitsa@yahoo.com

ABSTRACT
The study analyzes the marketing structure and consumption of fresh mango fruits in Minna metropolis. Eight fresh mango fruit markets were sampled for the survey namely Gwadabe, Chanchaga, GidanMangoro, PZ, TunganGoro and Maikunkele. They were purposively selected within the metropolis. 99 traders were drawn using simple random sampling from the stated markets. Data were collected using questionnaires. Similarly, data were analyzed using descriptive statistics, Gini coefficient index, Ordinary least square regression techniques and marketing margin. Results of the analysis indicated that most (61.6%) of the traders were within the active age brackets of 25 – 54 years. All (100%), of the traders were found to be male, married (88.8%), literate (93.0%) and trading experience of 1 – 20years (57.6%). The result of OLS shows an R^2 of 0.52, which indicates that 52% of the variation in the consumption of fresh mango fruits in the area could be explained by the explanatory variables included in the model. The Gini coefficient index of the market was found to be 0.60, which revealed that the market is an imperfect market due to high net margin (63.1%),low producer share (22.7%) and economies of scale among few traders. Analysis of the challenges revealed high transportation cost (27.3%), poor storage facilities (23.2%) and inadequate credit facilities (17.2%). To improve the system, it is recommended that the traders should be encouraged to form cooperative societies or groups and government should be concerned with improvement of infrastructures, such as storage/processing facilities, construction and repair of feeder roads/rail-line, and above all traders should be assisted with marketing credit to avoid "forced" sell of their products which often erode their profit.

Keywords: Marketing, Structure, Consumption, fresh Mango Fruits, Niger State.

INTRODUCTION
The level of fruit consumption in Nigeria is rising annually owing to greater appreciation of their value (Haruna, 2003). However, most of the fruits including Mango (*Mangifera indica*) are perishable in nature and therefore, efficient marketing is a pre-requisite for the satisfaction of both producers and consumers. Mango production has risen by 7 percent annually since 1997, and the bulk of these fruit (98%) are grown in developing economies like Nigeria especially in the rural areas where agriculture or specifically farming is their principal occupation (Baba, 2004).

Latest figure of fruit production shows that pineapple accounts for 44 percent of the total traded volume and mango fruits ranked second (27%), followed by Avocados (12%) and papayas (7%) (Onu and Illiyasu, 2008). The main reason for increased demand of tropical fruits, including Mango is the growing familiarity of consumers with tropical fruits, their palatability and nutritivity and cooking qualities. Furthermore, as Lumpkin, Weinberger and Moore (2005) pointed out, worldwide production of fruits and vegetables have grown faster than the general crops. Nutritionally, fruits are rich source of vitamins and minerals, dietary fibre and provides additional calories and proteins (FAO, 2010). Economically, per capital income from horticulture has been reported up to five times higher than cereal production. Promotion of the production of, and trade in fruit and vegetable has recently become one of the key objectives of developing nations.

Most fruits are perennial trees and can live more than fifty years. Apart from their economic importance, they are forest and environmental friendly to fight against drought, used as shade, firewood, ornamental for agro-industry, export crop among others. Unfortunately, their status in agricultural policy was low in Nigeria. Moreso, because of the fact that substantial proportion of fruits consumed in Nigeria can come from wild, incidental and traditional cropping systems, there has been a general tendency to take their production and marketing for granted. (Yashitela, 2006).

Mango is a natural fruit all over the world, and is popularly known as "king of fruits". The fruit is believed to have originated from the North-West Bangladesh. However, the fruit also thrives well in most tropical countries (FAO, 2010), and belong to the family Anacardiaceae, in the plant kingdom (FAO, 2006). The major mango producing countries in the world include India, China, Thailand, Pakistan, Mexico, Indonesia, Brazil, Philippines and Nigeria.

Mango is a perennial plant which lives more than fifty years (FAO, 2006). The fruit have small point at done and known as beak (Yeshitela, 2004). It is usually harvested when the plant is fresh (Onu and Illiyasu, 2008), and high in moisture, and distinguished from field crops which are harvested at the matured stage for their grains, pulses, oil seeds or fibre.

It is universally recognized that mangoes are important dietary requirement and that its production, marketing and processing are significant economic contributors. In terms of poverty alleviation, the mango industry provides both employment and income to farmers, marketers and exporters (Ekesi and Billah, 2006).

Marketing of agricultural produce, including mango begins at the farm when the farmer plans his production to meet specific demands and makes proposals. The concept of utility are central in agricultural marketing (Ndanitsa, 2005). The primary role of an integrated marketing system is to add form, place, time and possession utility so that the subjective satisfaction of consumer is maximized (Kohls, 1985).

With the growing consciousness of health and better understanding of dietary role of fruits like Mango, increase in affluence of urban dwellers, fruit consumption has increased considerably. However, there is a huge gap between demand for, and supply of fruits. This problem is traceable not only to inadequate food supply but to inefficient marketing system. Mango fruit marketing system in Nigeria is poor and uncoordinated. The wide seasonal variations in quality and quantity, and price, relative perishable nature of fruits, inadequate transport system, poorly adapted and poor packaging and storage facilities result in heavy and these constitutes problems. Joseph and Adeoti (2006), revealed that the nature of distribution of fruits and vegetables in Nigeria marketing system is grossly inefficient, inadequate and that it is associated with high level of post-harvest losses and poor pricing. The whole marketing and distribution of fruits like mango in Nigeria is on the basis of supply and demand being catered for by a vast number of small individual efforts, disjointed, untrained and often part time, and as such, the system does not land itself to the necessary organization of transport, storage and efficient marketing. (Ndanitsa, 2005)

One of the major problems of mango marketing in Minna metropolis of Niger State, Nigeria is the post-harvest losses. This is attributed to the lack of processing and storage facilities available to the farmer, seasonable supply, high perishable nature of mango fruits, poor transport, poor packaging, which have led to heavy losses of fruits and as such, has reduced the amount available for consumption and increase the price of available ones. More of this is the indiscriminate pricing for mango due to lack of uniform grading, standard weight and measures. Therefore, there is high risk of spoilage of mango fruit. Complex supply chain is also an important problem for the development of Minna Mango industry. Weather and Climatic vagaries like wet and windy weather influenced the fruit potentiality for storage, by modifying physiology, chemical composition and morphology of fruits. Furthermore, fluctuation of market situation is also a major factor that affects the production and distribution of mango which results in no assurance of higher prices in market. Delay in getting payment of produce, pressing need of money for immediate payment (force selling) are also serious factors. (FAO, 2010).

In addition, the structure and conduct of fresh mango marketing in Minna metropolis is largely unreported in literature due to the absence of adequate information on fruit marketing in Minna metropolis derived from empirical studies, the behaviuor of actors in the market and the constraints they face, that imped further innovation and productivity in the fruit sub-sector. Structural characteristics have been used to classify markets as either perfect or imperfect. Structure can be identified in terms of the numbers, size and distribution of buyers and sellers, the degree of product differentiation, and the ease of entry and exist into the market.

The central theme of this study is that mango fruit marketing warrants special attention for several reasons. Firstly, the contribution as food (food security to our national life and their high nutritive value and secondly the structure of the fruit market can affect the economy of the people in the study area and consequently, the nations economy in significant ways. The study focuses exclusively on Minna metropolis because traders in the metropolis depend largely on the marketing of primary commodities such fruits and vegetables as a source of employment, livelihood, income and food supply. The study examined the socio-economic characteristics of the marketers, the structure of the marketing system and identifies the variables that determines the volume of fresh mango marketed.

Better marketing system will stimulate increased consumption and this will contribute to better health and improve the quality of life of citizenry. Similarly,

the study is aimed at contributing to the existing knowledge of the mango market with a view to improve their knowledge (marketers) on perceived problems of marketing mango fruit. The study also hopes to fulfill the need for data generation to grassroots which will serve as guide for the formulation of market policies by governments/non-governmental organizations towards improving mango production.

METHODOLOGY

Study Area: The study was conducted in Niger State of Nigeria. Niger State is located in the North-Central Nigeria. The state capital is Minna, and other major cities are Bida, Kontagora and Suleja. The State lies in the Guinea Savannah vegetation of the country with favourable climate. It lies between latitude $8^0 35^1$ North and longitude $3^0 30^1$ to $7^0 20^1$ East. The climate is sub-tropical and is characterized by a distinct dry and wet season with annual rainfall varying from 1,100mm in the North to 1,600mm in the south. The maximum temperatures which do not exceed 37^0c are between March and June with the lowest minimal temperatures of usually in December and January. The seasonal variations of air temperature are constant. The duration of the wet season ranges from 150 days between months of May to September in the Northern part of the state, and between the months of April to October in the Southern part (NSADP, 1997). The state has a population of 3,954,772 people (NPC, 2006), the estimated projection of population based on 3% growth rate per annum is 5,478,147 people by 2017. The state is bordered on the North by Zamfara State, to the East by Kebbi State and Federal Capital Territory (FCT) bordered the state at both North – East and South East. The state shares a common (International) boundary with the Republic of Benin in Borgu Local Government Area (ADP, 2008). The prominent linguistic groups within the state consist of Nupe, Gwari, Hausa, Fulani with small communities of other ethnic groups such as Yoruba, Ibo, Igbira, Kadara, Kakanda etc. The people's major economic activities are trading, farming craft and fishing. The climate, soil and hydrology permits the cultivation of most Nigerian staple crops and still leaves sample scope for grazing and forestry, and fresh water for fishing. The State has a total land area of 7 million hectares ($92,800km^2$) of agricultural land, which is about 10% of the total land area of the country, and in which 33 percent is under cultivation. The State potential of *Fadama* development is also enormous and the *Fadama* area of the state is 682,000 hectares (ha) of irrigable land with only 3.9 percent currently under irrigation farming of arable and tree crops. (NSADP, 1997).

Sampling Technique and Data Collection: Data collected for this research were from primary sources. The primary data was collected using structured questionnaires accompanied by interview schedule to the traders in the study area. The primary data collected included socio-economic variables such as age, household size, educational status, years of experience and source of finance and likewise problems associated with mango marketing. The study was conducted between January and March, 2016.

Purposive sampling was used to select eight markets within the metropolis namely Gwadabe, Chanchaga, Gidan Mangoro, Mobil, Bosso, Maikunkele, PZ and Tungan Goro. The sample for the study was drawn using simple random sampling from the stated markets. Ninety – nine (99) respondents (fresh mango marketers) were selected from the eight (8) markets. This number comprises of 23 local wholesalers, 13 distant wholesales or transporters, 29 commission agents and 43 retailers. Purposive sampling was adopted because these markets selected form clusters of mango marketing. All agents assembled in these markets for buying and selling of fresh mango fruits in Minna metropolis.

Method of Data Analysis: Descriptive statistics such as frequency distribution percentages, averages, tables etc, Gini concentration index, Ordinary least square regression techniques and marketing margin was used in data analysis. The models are specified below:

Gini Coefficient (G) =

$$I = \sum_{i=o}^{N}(aY_{i-1} + Y_i)(aX_{i-1} - aX_i) \text{.....(i)}$$

Where:

$\sum$ = Summation Sign

N = Number of elements or observations (markets)

Y = Percentage of trader income in fraction

X = Percentage of observation in fraction

aX = Cumulative percentage of X_s in fraction

aY = Cumulative percentage of Y_s in fraction

$aXi - 1$ = Difference between percentage of X_s (in fraction) and the one preceding it

aY_{i-1} = Difference between percentage of Y_s (in fraction) and the one preceding it.

Regression Analysis

Linear Function:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + U \text{ (ii)}$$

Where:

Y = Selling price of mango in ₦/kg

β = Constant

β_1 = β_6 = Coefficients of the variables

X_1 = Average cost of storage in ₦/kg

X_2 = Average cost of losses in ₦/kg

X_3 = Average cost of transport in ₦/kg

X_4 = Average quantity sold in ₦/kg

U = Error term.

Marketing Margin (MM)

$$MM = \frac{C_p - P_p}{C_p} \text{ ..... (iii)}$$

Where:

P_p = Producer price

C_p = Consumer price

Net Margin (MM)

NM = MM – TMC..... (iv)

Where:

MM = Marketing margin

TMC = Total marketing cost

Percentage of Net Margin (%) =

$\frac{MM - TMC}{MM} \times 100$ ..... (v)

RESULTS AND DISCUSSION

Results of the descriptive analysis of the socio-economic characteristics of the respondents in the study area as shown in Table 1 shows that most (61.60%) of the traders were within the active age brackets of 25 – 54 years, which agrees with Ajayi (2000), who found out that most of the fruit traders are in their economic active years and in productive age brackets recommended by the FAO. The mean age of respondents was 39 years According to FAO (2010), the age of the decision – maker is an important factor influencing change and enhancing adoption of improved agricultural production technologies. It is expected that younger farmers will accept innovation more easily than the older ones, as they are higher risk takers in expectation of profit. All (100%) traders were found to be males, which indicate the dominance of men in the marketing of fresh mango fruit. The result conforms with the norms, beliefs and values of the study area where religion does not allow woman unnecessary exposure (women in purdah), moreso, fruit trading is tasking and may not be convenient for the female traders. Table 1 also shows that majority of the mango traders (88.80%) in the study area were married couples, 8.1% were single and 3.1% were widowers. This shows that most of the fresh mango traders were likely to have families, and a strong indication of their chances of getting family labour for use in the business. This may probably reduce the demand for hired labour, and suggests a reduction in operating cost and increase in profit, which translates to improvement in their standard of living. The family size distribution of the respondents showed that 75.8% and 20.2% had a household size between 1 – 16 and 17 – 24 members respectively. The average family size of respondents was 13 people. This is likely an indication of low level of awareness of planning and reproductive health issues among the traders. The implication of these is that this may positively influence household food security if the members helped to reduce expenses on hired labour in trading expenses or production/operations (Eboh, 1995). However, Baba and Etuk (1991) and Baba and Wando (1998) explained that the implication of the large household sizes is that household expenditure tends to draw more on family income so that only a meager sum is saved and invested eventually on production. For the borrowed capital in the business, this is likely to affect the repayment capacity of the respondent.

With regards to educational level, majority (93.0%) of the respondents were literate. The result conforms favourably with Ajayi and Mbah (2002), who observed that the literacy level of fruit traders to a large extent determines the strategies which he/she may use to adopt new technologies in terms of storage and good record keeping, which will increase his/her profit (Binswanger *et al*; 1993). However, in spite of high level of literacy which was largely due to modern educational stitches, mango fruit marketers had little or no record of their activities kept. Furthermore, Table I also shows that 57.6% of marketers had between 1 – 20 years experience in Mango marketing, which is an indication that experience can also determine the level of knowledge and innovations in the business. This agrees with Aminu (2009) and Tiri*et al* (2012), who both stated that experience matters in the adoption of recommended packages and innovation in modern marketing techniques of fruits and vegetables. The result in Table 1 also reveals that most (60.6%) of the marketers financed their businesses through personal savings, which is an indication that most of the traders were small scale traders who may not have the means of access credit or financial assistance from financial institution.

Table 2 shows the result of the Gini coefficient index of the mango marketers, which was found to be 0.60, and this reveals that the market is an imperfect market. This finding is in agreement with Apata and

Apata (2003), who in the analysis of vegetable market in Ibadan metropolis, Oyo State, Nigeria reported imperfect competition in the market.

Scale economies were used to determine entry or exit condition of the market. The least square estimation model was used to verify the existence of scale economies. The result in Table 3 indicated a negative relationship between marketing cost and volume of mango handled. This means that as quantity sold increases, average cost of marketing decreases. However, decrease in average cost of marketing was not a barrier to entry, especially by sellers that are not financially sound. The result also indicated a significant relationship between average cost of marketing and quantity sold at *P<0.1.*

The result also showed a negative relationship between average cost of marketing and volume of mango fruit handled. This result verifies the existence of economies of scale among few marketers; it showed that some of the market intermediaries attract their products at considerably lower cost than others. Table 4 shows the result of the marketing margin of mango in Minna metropolis. The gross margin rate among surveyed traders in the study area was relatively high (₦563.3/basket), representing 77.3% of the price paid by the consumers. The high marketing margin also confirms an imperfect competition in the market. Analysis of the marketing margin received by each of the traders revealed that commission agent's margin was highest (37.37%). The analysis of the net margin along all channels was found to be ₦3552/basket, representing 63.1% of the consumer price. Moreftenthan not, about 22.7% of the marketing margin (₦1650.20/basket) goes to the producers, which is very low.

Analysis of the myriad of problems faced by mango marketers is shown in Table 5. This includes high cost of transportation/poor transportation problem, which was ranked first (27.3%). This is as a result of the poor road condition and the distance between the point of production and the market. It may also be a result of the high cost of transportation due to high fuel price-consequent of the deregulation of the downstream sector of the petroleum industry. Inadequate storage facilities such as refrigerator were ranked second (23.2%). This corroborates with the findings of Adewale (1996) and Yusuf (2014), both observed that inadequate storage facilities cause insect attack and over-ripening, which could lead to economic loss to the farmer and the nation as a whole. Other identified problems include inadequate pricing information and lack of market infrastructure.

Table 1: Socio-Economic Characteristics of Fresh Mango Fruit Marketers

Characteristics	Frequency	Percentage
Age (Years):		
17 – 20	17	17.2
25 – 34	9	9.1
35 – 44	19	19.2
45 – 54	33	33.3
55 and above	21	21.2
Mean age		39
Family Size		
1 – 8	47	47.5
9 – 16	28	28.3
17 – 24	20	20.2
25 – 32	4	4
Average family size		13
Educational Status		
Primary School	70	70.7
Secondary School	16	16.2
Tertiary Education	6	6.1
Craft	7	7.1
Experiences (Years)		
1 – 10	36	36.4
11 – 20	21	21.2
21 – 30	25	25.3
31 – 40	12	12.1
Above 41	5	5.1
Source of Finance		
Loan from Bank	2	2
Inheritance	19	19.2
Cooperative group	8	8.1
Personal savings	60	60.6
Friends/relatives	10	10.1

Source: Field Survey data, 2015

Table 3: Regression estimates for the influence of Quantity sold on Marking cost

Variable	coef	SE	T-Values
Constant	1.457	0.4625	-2.14
R^2	0.52		
Adjusted R^2	0.49		
Quantity Sold (Q)	-0.206*		
F-Statistics	24.335*		

Note: *Significant at 10%

Table 2: Determination of Market Coefficient

Sales Range (₦)	No of Markets	Sales value (₦)	X	Y	aX	aY	$aX_{i-1-a}X_i$ (B)	aY_{i-1} aY_i (A)	AXB
1,000 – 10,000	51	484,800	0.51	0.15	0.51	0.15	0.51	0.15	0.076
10,001 – 20,000	24	360,000	0.24	0.11	0.75	0.25	0.24	0.41	0.098
20,001 – 30,000	9	500,000	0.09	0.15	0.84	0.47	0.09	0.81	0.073
30,001 – 40,000	2	70,000	0.02	0.02	0.86	0.43	0.02	1.24	0.025
40,001 – 50,000	9	450,000	0.1	0.14	0.96	0.57	0.1	1.81	0.078
Above 50,000	4	1,266,000	0.04	0.4	1	1.97	0.04	2.78	0.111
Total	99	3,266,00	1						

G = 1 – 0. 401 = 0.599 = ≃ 0.60

Source: Field Survey Data Analysis, 2015

Table 4: Marketing Margin in N/Basket for fresh mango fruit marketing in Minna metropolis

Variables	Local Wholesalers	Distant wholesalers	Commission Agent	Retailer	Total
Sales	3046.03	4467.51	6295.13	7282.53	22091.2
Purchase	1650.2	3046.63	4467.51	6295.13	15458.87
Marketing cost	520	620	500	440	2080
Total cost of marketing service	2170.23	3666.03	496.75	673151	17538.86
Gross margin	1395.83	1421.48	1827.62	987.4	5632.33
Net margin (profit)	875.83	801.48	1327.62	547.4	3552.33
Net margin (%)	24.66	22.56	37.37	15.41	100

Table 5: Distribution of respondents based on constraints in fresh mango fruit marketing

Problem	Frequency	Percentage
High cost of transportation	27	27.3
Poor storage facilities	23	23.2
Inadequate credit facilities	17	17.2
Lack of marketing infrastructure	12	12.1
Poor patronage	8	8.1
Lack of pricing information	8	8.1
Lack of trading devices	4	4
Total	99	100

Source: Field survey, 2015

Conclusion

The study shows that the structural characteristics of mango marketing in Minna metropolis is that of imperfect due to a high Gini coefficient (0.60%), high net Margin (63.1%) and economies of scale among few traders. The study therefore, recommends the formation of cooperative society by the famers/traders, establishment of special cold rooms, provisions of storage facilities and credit facilities to improve the volume of trade. Government is encouraged to provide and improve on the existing infrastructures, such an roads, rail lines, water transportation, etc. which will reduce the cost of transportation, build a perfect competitive market, increase traders' share of marketing margin/profit.

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