Market Price Spread and Determinants of Net Farm Income of Sweet Potato Marketing in Onitsha Agricultural Zone, Anambra State, Nigeria

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Abstract

The study examined economics of market price spread and determinants of net farm income of sweet potato marketing in Onitsha agricultural zone, Anambra State, Nigeria. Specifically, it described socioeconomic characteristics, inter and intra market price spread of the marketers, marketing margin and market structure of the marketers, socioeconomic characteristics that influences net marketing income and constraints to sweet potato marketing in the study area. Multistage and random sampling procedure was used to select 120 respondents for the study. Data were collected from primary source and were analyzed using descriptive statistics, Gini coefficient, multiple regression and relative importance index. Findings from socioeconomic characteristics reported that sweet potato marketing is dominated by female at retail level due to small capital base requirement to start the business. Findings from inter market price spread showed that an average of cement bag which is equivalent of 50kg mean marketing margins realized by the marketers was high in Eke-Awka-Etiti (₦650.00) followed by Afor Nnobi and Relief Market (₦600.00), Coke Market (Afia Coke) (₦550.00), Nkwo Atani (₦500.00), Lafiaji Market (₦450.00) and finally Nwangene and Ose-Okwodu Markets (₦400.00). From the result of analysis of net returns, the marketing margin was 29.52% which is below 50% indicates an average return on investment in providing the marketing services. Sit-at-home palaver should be addressed by relevant stake holders to enable small holder marketers that depends on daily markets for survival to be in business and the need for government and stakeholders to look into the bad road menace that affects the transportation of sweet potato in order to reduce the level of losses and cost associated with the product were recommended.

Keywords: Price Spread, Farm Income, Sweet Potato

Introduction

Nigeria agriculture is the major source of food and accounts for about 35% of the Gross Domestic Product (GDP), 37% of merchandised export, 75% of the rural household income and 70% of employment Gbughemobi, Nkamigbo and Meludu (2021). Agricultural sector is an engine room for sustaining growth of Nigeria economy and still remain the mainstay of our economy by providing food for the teeming population, create jobs as well as wealth, raw materials for industrial sector and foreign exchange earnings. Nigeria is one of the sub Saharan African

Countries of which agriculture was the back bone of her economy before the oil boom of 1970s Nkamigbo, Isibor and Ekeke (2021). Agriculture is one of the effective ways to alleviate hunger, poverty and remained one of the top and widely profitable business sector. Over the years, agriculture has evolved from subsistence to modern agriculture whereby farmers are involved in the business of agriculture Ekeke, Isibor and Nkamigbo (2021). Nigeria agriculture is the major source of food and accounts for about 35% of the Gross Domestic Product (GDP), 37% of merchandised export, 75% of the rural household income and 70% employment Ezeano, Umeh, Okeke and Gbughemobi (2017).

Sweet potato (Ipomoea *batata* Latin) is an important tropical root crop. It belongs to the morning-glory family known as Convolulaceae and it's originated from Latin America and it is sixth most important world food crop after rice, wheat, maize and cassava. The crop can be considered promoting nutritional security particularly in agriculturally backward area. Besides carbohydrates, it is a rich source of lipid, protein, carotene and calcium (FAOSTAT, 2010 and Ocholi and Udeh, 2017). Udemezue (2019) and Nkamigbo and Isibor (2021) opined that Sweet potato (Lpomea batatas L) is a herbaccous, warm weather creeping plant that belongs to the family of Convolulaceae and Genus Ipomoea. It originated from South America where it was introduced to Europe between 153AD. Sweet potato is regarded as world most important food crop due to its high yield. The family is made up of 45 genera and 1000 species it grows throughout the world from latitude $400°N$ to latitude $350°S$. It grows best at a temperature of between $24°C$ with annual rainfall of 1000mm to 7000mm (Sanusi and Adesogun, 2014 and Isibor, Nkamigbo and Ekeke, 2021). According to Ejechi, Anyaegbunam, Okoye and Eleodinmuo (2014) sweet potato is an important tropical root crop that ranks second after cassava among the tropical root crops. It is a rich source of Carbohydrate, Protein, Lipid, Calcium and Carotene. It becomes an ideal crop for popularization in areas with poor soils and poor agricultural infrastructural facilities, it is a major crop that suffered serious neglect in the past but now occupies global position as a source of food and industrial raw material. It is widely grown crop in Nigeria.

Anyaegbunam. Muogbo and Eleodinmuo (2015) opined that sweet potato has tremendous potential to be efficient and economic source of energy within Sub Saharan Africa. It is the third most important root and tuber crop after cassava (Manihot *esculenta*) and yam (Dioscorea *species*). Both root and leaves are good source of vitamin A, vitamin B, vitamin C, Calcium, Iron, Potassium and sodium with small amount of protein in both roots and leaves. They further stated that sweet potatoes are extremely adaptable to adverse environmental conditions, they can help increase food security in times of drought and famine, particularly in post conflict areas for displaced person. Sweet potatoes produce carbohydrates much faster and require less labour than other crops.

 Okeke and Mbah (2021) stated that sweet potato is a short duration crop with high yield and economic returns and it is only root crops that can be grown and harvested within four months in Nigeria. Sweet potato can be grown to three times in a year with supplementary irrigation. It has low soil fertility requirement and better opportunity cost relative to other root and tuber crops such as cassava, yam and cocoyam (Food and Agriculture Organization (FAO), (2012) as cited by Okeke and Mbah (2021). Sanusi, Lawal, Sanusi and Adesogan (2016), Baruwa (2016) and

Udemezue (2019) stated that Nigeria is one of the largest producers of sweet potato in Sub-Saharan Africa with annual production estimated at 3.46 million tonnes per year and fourth largest producer in Africa while Egypt is Africa number one producer followed by Malawi. It was introduced in Nigeria in the late 1694-1698 through the early activities of the Portuguese and Spanish explores Mbanaso (2010) as cited by Nkamigbo and Isibor (2021).

Sweet potato is highly adaptable to relatively marginal soils and erratic rainfall, has high productivity per unit of land and labour and guarantees some yield even under the most adverse conditions. It is a low input crop that is a good source of vitamins which can be substituted for maize in livestock production. Kolawole, Owolabi, Ajala and Onuh (2017) opined that sweet potato is highly nutritive and it supersedes most carbohydrate foods in vitamins, minerals, dietary fibre and protein contents. It contains vitamin A rich in Beta-carotene. It is a cheaper and rich source of vitamin A for children, pregnant and lactating women especially among the rural poor. These inherent nutrition and health potentials in sweet potato comfortably place it as a crop that can help address food insecurity and reduce poverty which is almost endemic in sub-Saharan Africa. Ocholi and Udeh (2017) reported that sweet potato is capable of meeting the consumption need of the house hold as well as generating income for them to enable them buy other valuables.

According to Nkamigbo and Isibor (2021), sweet potato plays a great role in developing Countries, it provides job opportunity to teeming population by raising their income. The demand for sweet potato is quite higher than the supply due to higher nutritional value, cheap and inexpensive of the product compared to other root source of carbohydrates and vitamin. The leaf of potato can used to feed animal either dehydrated into chips, canned, cooked and frozen, creamed and used as pie fillings. It could also be dried and ground into flour to make biscuits, bread and other pastries. Baby food has been formulated using sweet potato while some bakeries blend 15-30% of sweet potato flour for making bread and 20-30% for pastries. It is used for brewing of alcoholic drinks and a sweetness in non-alcoholic drinks Isibor et al. (2021).

Udemezue (2019) and Isibor et al, (2021) opined that sweet potato can be pounded together with yam to give a delicious meal. Sweet potatoes have medicinal value, the leaf decoction is used in folk remedies for asthma, bug bites, burns, catarrh, ciguatera stomach distress and tumor. Sweet potato starch can be used in textile, glue, paint and cardboard industries. Industrial potentials of sweet potato have not been exploited due to mainly chronic lack of awareness to the abundance of industrial and commercial benefits.

Materials and methods

Onitsha agricultural zone is located at the southern part of Anambra State at the latitude of 6°05-8°-21°N of the equator and longitude 6°.44-7.41°E of the meridian. The zone has an estimated population of about 2 million people (Wikipedia, 2022). The zone is made up of seven (7) LGAs, Ekwusigo, Idemili North, Idemili South, Ihiala, Ogbaru, Onitsha North and Onitsha South. The landscape of the area is lowland with temperature of 39°. It experiences two major seasons, the rainy season starts at the end of March and lasts till the end of October and dry season covers from the month of November and ends in the month of February. There is a high rate of commercial

activities due to the presence of the City of Onitsha and Onitsha main market which is the largest single market in the West Africa Sub-region. There are other several markets in the zone where almost every agricultural produce is marketed both wholesale and retail.

Population and Sampling Technique
The study was made up of all sweet potato marketers in Onitsha Agricultural zones, Anambra State, Nigeria. Multistage, purposive and random sampling methods was used to select 4 Local Government Areas, 8 daily sweet potato markets (Agricultural Food) markets and 120 respondents for the study. The respondents were selected based on the size of the markets. Details of selection process is given as:

Stage 1: Four Local governments were randomly selected from the agricultural for the study.
Stage 2: This involves purposive selection of two daily markets with large number of intermediaries and consumers from each selected LGAs. The selection was based on open dairy nature, large intermediaries handled making it a total of 8 markets for the study.
Stage 3: 15 sweet potato marketers were randomly selected from each of the 8 markets selected in stage two making it a total of 120 respondents for the study.

Table 3.1 Sampling of markets and respondents

Agricultural zone	LGAs selected	Markets selected	Intermediaries selected
Onitsha	Onitsha North	Ose Market	15 marketers
		Ahia Nwangene	15 marketers
	Ogbaru	Afor Atani	15 marketers
	Ekwusigo	Orie-Akpu Ozubulu	15 marketers
		Nkwo-Ozuluigbo	15 marketers
	Idemili	Afor- Nnobi	15 marketers
		Eke- Awka-Etiti	15 marketers
	4 LGAs	**8 Markets**	**120 Marketers**

Source, Field Survey, 2023.

 Data collection and analysis
Data for the study were collected from primary source. Primary data were obtained using structured questionnaire to the respondents from the list of sweet potato marketers obtained that constituted the sampling frame for the study. The objectives of the study were analyzed through descriptive statistics, Gini coefficient, multiple regression and relative importance index.

 Model specification
The model was used to measure the influence of socio-economic characteristics on net marketing income of marketers (multiple regression model). Socioeconomic factors are as follows:
NMI = Net Marketing Income '

AGE = Age in years

GEN = Gender (dummy: male =0; female = 1)

MRS = Marital status

EDU = Educational level

SOF = Source of finance

HOS = Household size (number of persons living together)

TOU = Membership of trade union (dummy: member =0, non-member = 1)

EXP = Marketing experience

MKS = Marketing cost

PDP = Product price

e = Stochastic error term.

It is implicitly represented below as

$$NMI = \beta(AGE_1, GEN_2, MRS_3, EDU_4, SOF_5, HOS_6, TOU_7, EXP_8, MKS_9, BOP_{10} \ldots e_i)$$

Four functional forms of the regression models (linear, exponential, semi-log and double log) will be used and the model that best fit will be adopted as the lead model.
Acronyms:

NMI = Net marketing income

The explicit versions of the functional forms are stated as:

NMI = β_0 + β_1AGE$_1$ + β_2GEN $_2$ + β_3MRS$_3$ +β_4EDU$_4$ +β_5SOF$_5$ +β_6HOS$_6$ + β_7TOU$_7$+β_8BOP$_8$ +β_9EXP$_9$ + β_{10} MKC$_{10 +}$ MOD$_{11}$+e$_1$

Linear form:

$$NMI = \beta_0 + \beta_1 AGE_1, \beta_2 GEN_2, \beta_3 MRS_3, \beta_4 EDU_4, \beta_5 SOF_5, \beta_6 HOS_6, \beta_7 TOU_7, \beta_8 EXP_8, \beta_9 MKS_9, \beta_{10} BOP_{10} \ldots e_i$$

Semi Log form

$$NMISN = \beta_0 + \beta_1 logAGE_1 + \beta_2 logGEN_2 + \beta_3 logMRS_3 + \beta_4 logEDU_4 + \beta_5 logSOF_5 + \beta_6 logHOS_6 + \beta_7 logTOU_7 + \beta_8 logEXP_8 + \beta_9 logMKS_9 + \beta_{10} logBOP_{10} + \beta_{11} logMOD_{11} + \cdots e_i$$

Double Log form:

$$Log\ NMISN = \beta_0 + \beta_1 logAGE_1 + \beta_2 logGEN_2 + \beta_3 logMRS_3 + \beta_4 logEDU_4 + \beta_5 logSOF_5 + \beta_6 logHOS_6 + \beta_7 logTOU_7 + \beta_8 logEXP_8 + \beta_9 logMKS_9 + \beta_{10} logBOP_{10} + \beta_{11} log\text{MOD}_{11} + \cdots e_i$$

Exponential form:

$$Log\ NMISN = \beta_0 + \beta_1 logAGE_1 + \beta_2 logGEN_2 + \beta_3 logMRS_3 + \beta_4 logEDU_4 + \beta_5 logSOF_5$$
$$+ \beta_6 logHOS_6 + \beta_7 logTOU_7 + \beta_8 logEXP_8 + \beta_9 logMKS_9 + \beta_{10} logBOP_{10}$$
$$+ \beta_{11} logMOD_{11} + \cdots e_i$$

Gini coefficient was used to determine the market concentration or nature of competition in the market i.e. market structure. The technique was used to measure the degree of inequality in the volume of trade by the marketers as:

Gini coefficient is being calculated as follows:

$$Gini\ coefficient = 1 - \sum XY$$

Where:
X = the ratio of percentage of onion marketers
Y = the ratio of cumulative percentage of their income
$\sum$ = summation sign.

Marketing margin and marketing efficiency models were adopted from Mendoza (1995) as applied by Kadurumba, Mejeba and Nwaru (2021) and are specified as:

$$NR = TRS - TM \hspace{3cm} 1$$

Where, NR= Net returns measured as the difference between the total revenue and the total cost of fresh pepper marketing. TRS = Total Revenue sales which is obtained by calculating the total amount (₦) realized from the sales of fresh pepper, TMC= Total marketing cost is the sum of the total cost incurred in marketing fresh pepper. Marketing margin is one of the indicators usually identified with marketing efficiency, the formula is specified thus:

$$M_m = \frac{S_p - P_p}{S_p} \times \frac{100}{1} \hspace{3cm} 2$$

Where M_m= Marketing margin(₦), S_p= selling price (₦), P_p= Purchase price(₦) .

Marketing efficiency describes the movement of goods from producer to consumers at lowest marketing cost consistent with the provision of the services that the consumers' desire and can afford specified as thus:

$$M.E. = \frac{\text{Value added by marketing(net return)}}{\text{Total marketing cost } (TMC)} \times \frac{100}{1}$$

For processors, cost and return analysis were used for profitability, thus $NR = TRS - TMC$

Constraints to sweet potato marketing

The respondents were asked to rate the problems the face sweet potato marketing from a list of problems complied by the researcher. The relative importance index was used in determining the degree of importance of the problem as follows: Very important =4, Important =3, moderately important =2, Not important = 1. The responses on constraints to sweet potato marketing will be disaggregated as follows:

Where:

$RII = \sum W$ /A*N

Where:

RII = Relative importance index

W = Weighting given to each factor by the marketers (ranging from 1-4)

A = Is the highest weight, N = Is the total number of marketers

To make inferential statement, the mean score will be compared with the critical mean, 2.5. If the calculated mean of a problem is greater than the standard critical value, then the problem is regarded as very serious.

RESULT AND DISCUSSION

Socioeconomic characteristics of garden egg-leaf marketers

Socioeconomic characteristics of marketers in Table 1 indicates that majority of the marketers are within the age limit of 30-40 years (41.66%). The implication of this is that they are energetic and relatively young people who are ready to face hustle of bulky agricultural commodity like sweet potato. This is in tandem with Nkamigbo and Isibor (2021) who reported that sweet potato marketers in Anambra State were young and are in their prime age. Sweet potato is dominated by female (81.66%) among the small holder marketers in the study area. This is in agreement with OcholiAli and Udeh (2017) who reported that sweet potato marketing in their area of study was dominated by female at retail level due to small capital base requirement to start the business. Findings revealed that majority (65.83%) of the marketers are married. The implication of these is that their children will be a channel of outlets of marketing the commodity for maximum income. The result revealed that in the study area, all the marketers can read and write but more had primary school certificate (65%). Due to the nature of the enterprise, many started their business with the money they saved (65.83%). This is at variance with Ekeke, Isibor and Nkamigbo (2021) who opined that friends and relatives were instruct mental for resources for kick-off finance for actors in advancing agribusiness using social network in Anambra State. From the result 1-5 persons living and eating from the same pot recorded a high percentage of (63.33%). It was discovered that in order to attract customers 65.83% of the marketers brands their products to attract their intending end users. This puts them at edge to other marketers. Also the study reveals that 50.0% of the marketers have 6-10 years' experience in the enterprise. This agrees with Ejechi, Anyaegbunam, Okoye and Eleodinmuo (2016) who reported that about 50% of sweet potato marketers in their study area have less than 10 years of experience in the enterprise. The findings revealed that

majority (55.83%) of the marketers have unregistered union called Isusu where they contribute money for their welfare and carter for their members.

Table 1: Socioeconomic characteristics of sweet potato marketers   N=120

VARIABLES	FREQUENCY	PERCENTAGES
Age		
<30	25	20.83
31-40	50	41.66
41-50	20	16.66
51-60	16	13.33
61 and above	9	7.50
Total	**120**	**100**
Gender		
Male	22	18.33
Female	98	81.66
Total	**120**	**100**
Marital Status		
Single	20	16.66
Married	79	65.83
Widow/Divorced	21	17.5
Total	**120**	**100**
Educational Status		
0-6	78	65.0
7-12	39	32.5
13-18	03	2.5
Total	**120**	**100**
Source of Finance		
Personal savings	79	65.83
Friends and relatives	41	34.16
Cooperatives/Isusu	-	
Banks	-	-
Total	**120**	**100**
Household Size		
1-5	76	63.33
6-10	39	32.50
11 and above	05	4.16
Total	**120**	**100**
Trade Union		
Member	67	55.83
Non Member	53	41.16
Total	**120**	**100**
Market Experience		

1-5	15	12.5
6-10	60	50.0
10 and Above	45	37.5
Total	**120**	**100**
Branding of commodity	79	65.83
Non-branding	41	34.16
Total	**120**	**100**
Mode of delivery		
Keke/Tricycle	55	45.83
Bus/Truck	31	25.03
Okada	34	28.80
Total	**120**	**100**

Source, field survey, 2023.

Inter market and seasonal price spread of sweet potato
The peak demand for sweet potato is from December to April while the lean demand season is from May to October. During the peak period, the price of sweet potato rises only to drop at the expiration of the peak production season. Table 4.2 shows the peak season in selected daily markets in Onitsha agricultural zone in Anambra State. An average of cement bag which is equivalent of 50kg mean marketing margins realized by the marketers was high in Eke-Awka-Etiti (₦650.00) followed by Afor Nnobi and Relief market (₦600.00), Coke market (₦550.00), Nkwo Atani (₦500.00), Lafiaj market (₦450.00) and finally Nwanmega and Ose-Okwodu markets (₦400.00). The observed differences in marketing margins was as a result of the selling price differentials arising from differences in marketing costs incurred by the traders at the different markets.

Table 2 Peak season of sweet potato marketing   cement bag

AZ	LGA	MARKET	MPP	MSP	MMM
Onitsha	Onitsha North	Ose-Okwodu	7500	7900	400
		Nwanmega	7800	8200	400
	Onitsha South	Lafiaj	7550	8000	450
		Relief market	7600	8200	600
	Ogbaru	Coke market	7850	8400	550
		Nkwo Atani	8100	8600	500
	Idemili South	Afor Nnobi	8300	8900	600
		Eke Awka-Etiti	8350	9000	650

Key Note: AZ-agricultural zone, MPP-mean purchase price, MSP-mean selling price and MMM-mean marketing margin. Source, field survey, 2023.

Lean season of sweet potato marketing
Lean season of sweet potato starts from May to October. At this period rain fed sweet potato produce is out in the market and the price drastically drop because most of the produce is sourced within the State and its environs. Highest mean marketing margin of (₦600.00) was realized from Coke market and Nkwo-Atani and lowest (₦400.00) in Ose-Okwodu and Nwanmega markets.

From the result, the study noted that the prices within the markets were almost uniform. This implies that the marketers were aware of the prevailing market price of sweet potato within the markets in the zone.

Table 2.1: Lean season of sweet potato marketing

AZ	LGA	MARKET	MPP	MSP	MMM
Onitsha	Onitsha North	Ose-Okwodu	2500	2900	400
		Nwanmega	2500	2900	400
	Onitsha South	Lafiaji	2600	3100	500
		Relief market	2600	3100	500
	Ogbaru	Coke market	2600	3200	600
		Nkwo Atani	2600	3200	600
	Idemili South	Afor Nnobi	2550	3100	550
		Eke Awka-Etiti	2550	3100	550

Key Note: AZ-agricultural zone, MPP-mean purchase price, MSP-mean selling price and MMM-mean marketing margin. Source, field survey, 2023.

Net returns of sweet potato marketers (average quantity/week)

Marketing margin is the difference between purchase price and price received on resale Olukosi and Isitor (1990) as applied by Sulumbe, Shettima and John (2015). The marketing margin reflects the effect of the product characteristics on the complexity of the marketing functions that must be performed as the product passes through the marketing system. From the result of analysis, the marketing margin was 29.52% which is below 50% indicates an average return on investment in providing the marketing services. This is in agreement with Sulumbe et al. (2015) who reported a market margin of 27.27% which implies that the marketers get a fair share of the profit realized in the marketing of sweet potato in the study area. The net return per naira invested was 1.26%. The implication of this is that for every one naira invested in the enterprise, 1.26k was generated as profit. This implies that sweet potato marketing is profitable in the study area.

Table 3.1: Net returns of sweet potato marketers (average quantity/week)

Variables	Quantity (1 cement bag)	Unit cost(₦)	Total cost (₦)
Purchase	1500	2500	**3, 700, 000.00**
Transportation			280,000.00
Loading		90.00	135, 000.00
Miscellaneous			50, 000.00
Total variable cost			**4, 165, 000**
FIXED COST			
Selling point rent			150, 000.00
Depreciation and Taxes			48, 450.00
Total market cost			**4, 363, 450.00**
Selling price		3500	**5, 250, 000.00**
Revenue			**5, 250, 000.00**
Net return (TR-TC)			**886,550.00**
Performance indicators			
Marketing margin			29.52

Marketing efficiency	120.3
Return on Naira investment (₦)	1.26

Source, field survey, 2023.

$$M_m = \frac{S_p - P_p}{S_p} \times \frac{100}{1}$$
$$= \frac{5,250,000 - 3,700,000}{5,250,000} \times \frac{100}{1} = \frac{1,500,000}{5,250,000}$$
$$= 29.52\% \ marketing \ margin$$

The marketing efficiency analysis showed that the marketers had an efficiency of 120.3%. This implies that they are efficient in performing their marketing functions. This agrees with Sulumbe *et al.* (2015) who reported a marketing efficiency of 132% and 129% for wholesalers and retailers of onion marketing in the study area. This is at variance with Ocholi and Udeh (2017) who reported marketing efficiency of sweet potato marketing of 0.85% and 0.94% at wholesale and retail levels respectively.

$$Marketing \ efficiencyn = \frac{value \ added \ by \ marketing \ (Net \ Return)}{Total \ marketing \ (TMC)} \times \frac{100}{1}$$
$$= \frac{5,250,000 \times 100}{4,363,450}$$
$$120.3\% \ marketing \ efficiency$$

Market structure of sweet potato marketers
Nkamigbo and Isibor (2021) opined that Gini coefficient measures the relative degree of income distribution among sellers of the product. Results of the analysis of market structure using Gini coefficient is shown in Table 4. The result revealed a Gini coefficient of 0.785. This implies a high level of income inequalities (sale margin) in the distribution of income among the marketers and high concentration of sales in the hands of few marketers hence existence of imperfect competition in the market. The result revealed that some marketers can influence price of the commodity. This is in consonance with the report of Nkamigbo and Isibor (2021) who reported a Gini coefficient of 0.6218 and 0.6927 (an imperfect market) for wholesalers and retailers of sweet potato marketers in Anambra State. The result is at variance with Ocholi and Udeh (2017) who reported a Gini coefficient of 0.43 and 0.49 although it is a relatively high level of inequality among the traders for wholesalers and retailers of sweet potato marketers respectively in Benue State.

Table 4: Estimated Gini coefficient of sweet potato marketers

Monthly Sales (₦)	F	Pro of WTsX_1	Cum. Of WTs (₦)	TMS (₦)	Cum. Pro of TMS Y_1	X_1Y_1
80, 000- 320,000	43	0.3583	0.3583	1, 491, 250.00	0.2840	0.1017
321,000- 560, 000	35	0.2916	0.6499	1, 033, 650.00	0.1968	0.0570
561, 000-800,000	21	0.1750	0.8249	962, 500.00	0.1833	0.0320
1041, 000- 1280,000	13	0.1083	0.9332	875, 000.00	0.1666	0.0180
1281, 000- 1520, 000	03	0.0250	0.9582	231, 300.00	0.0440	0.0011
1521, 000 and above	05	0.0416	0.9998	656, 300.00	0.1250	0.0052
	120			5, 250, 000.00		0.2150

Key Note: WTS= Wholesalers. Pro= Proportion. Cum=Cumulative. TMS=Total monthly sales.
Source: Field survey, 2023.

$$GC = 1 - \sum X_1Y_1 , 1 - 0.2150 = 0.785$$

Table 4: Socio-economic characteristics that influences net marketing income

Variable	Linear	Double log	Exponential	Semi-log
Constant	12563(0.89)	3.1132(5.05)	2.1112(10.45)	32240(-2.12)
AGE	354(0.13)	0.0442(0.25)	0.01273(0.38)	12341(1.34)
GEN	-9713(-2.32)**	-0.3122(1.26)	-0.13428(-2.13)**	-30743(-1.95)**
MRS	217.9(0.18)	0.09988(1.89)*	-0.004113(-0.82)	-1665(-0.45)
EDU	3301.6(0.72)	0.2049(1.18)	0.009457(1.12)	14922(2.26)** *
SOF	-34.1(-0.13)	0.0868(0.77)	0.002713(0.66)	2746(-0.38)
HOS	4766(1.33)	0.2955(1.04)	0.07024(0.30)	22775(1.46))*
TOU	0.007992(2.29)**	0.013776(2.24)**	0.00000015(1.72)*	876.3(2.33
BOP	0.017119(3.23)**	0.09044(4.346)***	0.00000019(2.42)**	9733(2.25)**
EXP	295.7(0.52)	0.3481(3.445)	0.008222(0.95)	3457(1.1260)*
MOD	3207(1.02)	0.0232(0.14)	0.03839(0.82)	12604(1.21) **
MKC	-253.9(-1.79)*	-0.2110(-1.74)	-0.002157(-1.91)	7564(-1.84) **
R^2	64.2%	60.9%	66.2%	76.4%
R^2Adj.	60.9%	54.8%	63.9%	71.4%
F-Stat.	5.51	7.69	5.30	8.28
D-WStat	1.75	1.60	1.62	1.79

Key Note: * = significant at $p < 0.10$, **= significant at $p < 0.05$, *** = significant at $p < 0.01$.
Figures in ( ) are T ratios. Source, field survey, 2023.

Table 4 shows the output of the four functional forms of the regression model for predictors of sweet potato marketing. The result indicated that the output of the semi-log gave the best result in terms of number of significant predictors, signs and sizes of the predictors as well as the value of

F-statistic, R^2 and R^2 adjusted and was chosen as the lead equation. The coefficient of multiple determination (R^2) 76.4% meant that 76% of the variation in the profit of the sweet potato marketers was explained by the variations in the independent variables while the remaining 24% was due to error. The F-statistic value of 8.28 was significant and confirms to overall significance of the regression analysis. The regression equation is given as:

$$NMI = 32240 + 12341AGE + 30743GEN + 1665MRS + 14922EDU + 2746SOF$$
$$+ 22775HOS + 876.3TOU + 9733BOP + 3457EXP + 12604MOD + 7564MKS$$

Out of eleven independent variables included in the model, gender, education, household size, marketing experience, branding of product and marketing cost were statistically and significantly influenced net marketing income earned by the respondents. The remaining five (age, marital status, source of finance, trade union and mode of delivery) were not significant. The coefficient of gender had a positive and but negative relationship with net marketing income at 5% probability level. This implies that gender plays an important role in sweet potato marketing and there is dominance of female in the enterprise than male. The coefficient of educational status was significant and positive at 1% probability level. This implies that the higher the educational status, the higher the net marketing income. The coefficient of household size was significant and positive and had a significant effect on the net marketing income at 10% probability level. This implies that as the marketer's household size increases, income from sweet potato sales increases. The members of the household help in the marketing of the commodity. The coefficient of marketing experience was positive and had a significant effect on the net marketing income at 10% probability level. This implies that as the marketer's experience in the enterprise increases, the income they made increases. The coefficient of branding of product experience was positive and had significant effect on the net marketing income at 5% probability level. This implies that those that add value to their commodity by washing and proper arrangement in displace increases their income. The coefficient of marketing cost was positive and had a significant effect on the net marketing income at 5% probability level. This implies a positive relationship between marketing cost and net marketing income. The marketers who invested more money in the enterprise earned higher profit.

Constraints to sweet potato marketing
The constraints associated with sweet potato marketing in the study area were shown in Table 5. The findings show that price fluctuation (M=3.25) was perceived as the most serious challenges facing sweet potato marketing in the study area. The price of sweet potato is highly unstable due to seasonality of the produce and most times the produce is source from the Northern part of the country while it is readily available in the study area during production period (rainy season). The study revealed that high transportation cost is another serious problem the marketers encounter in the marketing of sweet potato in the study area. This is in agreement with Ocholi and Udeh (2017) who reported that bad road affects sweet potato marketing. High park and government charges were noticed (M = 05) as a problem to the marketers due irregular and inconsistency of taxes imposed on the actors by park management and agents of the government. The marketers find it difficult to sale most often due to irregular sit-at-home imposed by a group calling for succession

in the Southern part of the country. Other constraints noticed in the study area were inadequate capital, wounds and damage by diseases, seasonality and lack of storage facilities.

Table 5: Constraints to sweet potato marketing

Constraints	Mean Score	Ranking
High transportation cost	3.18	2nd
High park and government level	3.05	3rd
Seasonality	2.40	7th
Price fluctuation	3.25	1st
Wounds and damage by diseases	2.50	6th
Inadequate capital	2.80	5th
Sit-at-home palaver	3.01	4th
Lack of storage facilities	2.04	8th

Source: Field survey, 2023.

Summary
Sweet potato is dominated by female (81.66%) among the small holder marketers in the study area. Findings from inter market and seasonal price spread of sweet potato showed that the peak demand is from December to April while the lean demand season is from May to October. The result of marketing margin was 29.52% which is below 50% indicates an average return on investment in providing the marketing services. The result of multiple regression analysis showed that out of eleven independent variables included in the model, gender, education, household size, marketing experience, branding of product and marketing cost were statistically and significantly influenced net marketing income earned by the respondents. Market structure analysis shows a high level of income inequalities (sale margin) in the distribution of income among the marketers and high concentration of sales in the hands of few marketers hence existence of imperfect competition in the market. Price fluctuation, seasonality of the produce and high transportation cost were perceived as the most constraints.

Conclusion
Sweet potato marketing in Onitsha Agricultural zone is a profitable venture given the positive values of gross margin, net marketing efficiency and return on investment. Inefficiencies still exist among the actors due to the activities of marketing constraints. It is expected that profitability will improve is adequate attention is taken by various stake holders to address the necessary market constraints.

Recommendation
Based on the findings of this study the following recommendation were made:
  i.   There is a need for government and stakeholders to look into the bad road menace that affects the transportation of sweet potato in order to reduce the level of losses and cost associated with the product.
  ii. There is a need to address the activities of middlemen by relevant stakeholders to combat the price fluctuation in the marketing of sweet potato.

iii. Sit-at-home palaver should be addressed by relevant stake holders to enable small holder marketers that depends on daily markets for survival to be in business

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