Economic Efficiency and Profitability of Watermelon Marketing in Anambra State.

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Abstract – The study examined the economic efficiency and profitability of watermelon marketing in Anambra State, Nigeria. Specifically, it described profitability, economic efficiency and constraints to watermelon marketing. Multistage sampling procedure which involved purposive and random sampling methods was used to select 240 marketers (120 wholesalers and 120 retailers). Data were collected from primary source using structured questionnaire and were analyzed by means of descriptive statistics, enterprise budgeting and Sherpherd-Futrell techniques. From the result, profitability indicators such as net marketing income, return on investment, net return on investment and coefficient of marketing efficiency of N 85, 809, 01.6 and N 24, 407,78.7; 1.11 and 1.37; 0.11 and 0.37; 89.46 and 72.57 for wholesalers and retailers respectively, proved the business profitable at both levels. The implication of the net return on investment figures is that the wholesalers and retailers respectively return 11 kobo and 37 kobo for every 1 Naira invested in the business. Findings also indicated marketing efficiency levels of 89.46% for wholesalers and 72.57% for retailers implying that the retailers were more efficient in the marketing of watermelon than the wholesalers. Findings on the constraints showed that high cost of products and high cost of transportation militated against watermelon marketing on the wholesale level whereas high cost of produce and spoilage of fruits (perishability) were noticed on the retail levels. Government should reconstruct dilapidated roads, construct new railways, expand water transport facilities, improve and modernize existing market infrastructural facilities. Watermelon marketers should form cooperative societies to enable them access government grants and loans to alleviate their financial challenges, improve their volume of trade and earn more income.

Keywords: Economic, Efficiency, Profitability, Watermelon

Introduction

Watermelon is highly appreciated by many people across the globe being a fresh fruit with low calories that contains vitamins A and C which help to address night blindness, eye problems, ear problems, dry skin, eczema and psoriasis (Ngbede, Nwanguma, Ibekwe, Onyegbulue, Okpara and Uwalaka, 2014). Watermelon is one of the world most important exotic vegetable that is cultivated both for its fruits and the vegetative parts which are highly nutritious (Okunlola, Adejoro and Fakanlu, 2011). The fruits of watermelon are used by the Sanpabo and by animals for both water and nourishment. It contains potassium which is believed to help in the control of blood pressure and possibly prevent stroke.

Table 1 Nutritional Values of Watermelon

Nutritional content	Value per 100g (3.5oz)
Energy	127kJ (30kcal)
Carbohydrates	7.55g
Sugar	6.2g
Fat	0.15g
Protein	0.61g
Vitamins	
Vitamin B_6	0.045mg (3%)
Vitamin C	8.1 mg (10%)
Vitamin A equivalent	$28\mu g$ (4%)
Chaline	0.045mg (3%)
Beta-carotene	$30\mu g$ (3%)
Thiamine (B_1)	0.033mg (3%)

Riboflavin (B_2)	0.033mg (3%)
Niacin (B_3)	0.178mg (1%)
Pantothenic acid (B_5)	0.221mg (4%)
Minerals	
Calcium	7mg (1%)
Iron	0.24mg (2%)
Magnesium	10mg (3%)
Manganese	0.038mg (2%)
Phosphorus	11mg (2%)
Potassium	112mg (2%)
Sodium	1mg (0%)
Zinc	0.1mg (1%)
Other constituents	
Water	91.45g
Lycopene	4.532 μg

Source: U.S. Department of Agriculture, 2015.

The United States Department of Agriculture Nutrient Data Base (2015) opined that energy content of watermelon is 30 calories, 91.45g of water, and contains vitamins and minerals that are essential to the body. Ugwumba, Omojola and Orji (2012) referred watermelon as a store house of daily requirements of the human body and other essential nutrients and also as the chief of the world's luxuries and king over all fruits of the earth. Kim (2008) reported that the Beta carotene content which is a guide to body cells is a powerful antioxidant and is known to protect the brain, improves proper functioning of the Kidney, reduce cancer risk, fight inflammation, antioxidant properties, asthma prevention, reduces blood pressure, reduces hypertension, prevents constipation, prevents dehydration, aids our body to sleep, muscle movement, learning and memory, helps to maintain the structure of cellular membranes, aids in the transmission of nerves impulses and reduces soreness and improve exercise in all athletes.

It was reported by Ajewole and Falayan (2008) and Kassali, Aremu and Shittu (2015) that watermelon production generates higher profit; provide more employment and income to farmers than those of indigenous vegetables and few people are aware of it. Watermelon is a thriving business in the State due to its nutritional and medicinal value, population and economic returns. It is either sold as a whole or sliced. The State has several daily markets both in the rural and urban areas where agricultural goods are sold especially watermelon known as watermelon markets (Nkamigbo, 2018).

Materials and Methods

The study was carried out in Anambra State. The predominant occupations in these areas include farming, fishing, trading, craft, etc. It is situated on a generally low elevation on the eastern side of the River Niger sharing boundaries with Delta State to the west, Imo, Abia and Rivers State to the south, Enugu state to the East and Kogi state to the North. The state occupies an area of about 4,844 Km2, lies within longitude 50551 and 60421N. The annual rainfall ranges from 1400 mm in the North to 2500 mm in the south with temperature of 250C- 350C. The population of the State is 4,182,232 with 863 sqkm density (NPC, 2006). It consists of twenty-one (21) Local government areas (LGAs) and four agricultural zones.

Population and Sampling Procedure:

The study population was made up of all watermelon marketers in Anambra State, Nigeria. Multistage, purposive and random sampling methods were used to select 12 Local Government Areas, 12 daily watermelon markets and 240 intermediaries (120 wholesalers and 120 retailers) for the study. The respondents were selected based on size of the markets. Details of the selection process are given as:

Stage 1: Three agricultural zones were randomly selected from the four agricultural zones of the State. **Stage 11:** Four Local government areas were randomly selected from each of the three selected agricultural zones, totaling 12 LGAs. **Stage 111:** This involved purposive selection of one daily market with large number of intermediaries and consumers from each of the selected LGAs. The selection was based on opened daily nature, large number of intermediaries and volume of produce handled per month as revealed by pre-test survey. A total of 12 markets were selected. **Stage 1V**. Tenwatermelon marketers,consisting of five wholesalers and five retailers, were

randomly selected from each of the selected twelve markets in stage iii, thus making a total of 240 respondents for the study as shown in Table 2.

Table 2 Sampling of Markets and Respondents

Agricultural zone	LGAs selected	Markets selected	Intermediaries
Awka	Awka North	Oye-Achalla	5 Wholesalers 5 Retailers
	Awka South	Eke -Awka	5 Wholesalers 5 Retailers
	Dunukofia	Afor -Umudioka	5 Wholesalers 5 Retailers
	Njikoka	Oye-Nimo	5 Wholesalers 5 Retailers
Aguata	Orumba South	Nkwo Umunze	5 Wholesalers 5 Retailers
	Aguata	Nkwo Igboukwu	5 Wholesalers 5 Retailers
	Nnewi North	Nkwo Nnewi	5 Wholesalers 5 Retailers
	Nnewi south	Afor Ukpor	5 Wholesalers 5 Retailers
Onitsha	Onitsha North	Ose-Okwaodu	5 Wholesalers 5 Retailers
	Onitsha South	Ochanja	5 Wholesalers 5 Retailers
	Ihiala	Nkwo Ogbe-Ihiala	5 Wholesalers 5 Retailers
	Idemili North	Afor Igwe-Ogidi	5 Wholesalers 5 Retailers
Total	12 LGA	12 Markets	240 Respondents

Source: Field survey, 2017.

Method of Data Analysis

The objectives of the study were realized using budgetary method, Sherpherd-Futrell technique and relative importance index ranking.

Model Specification

The budgetary technique was used to determine the profitability of watermelon marketing.
The budgetary technique is expressed 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 quality of j^{th} respondent's sales = Total revenue (TR) for j^{th} respondent.
$P_{xij}X_{ij}$ = Prices x qualities of j^{th} respondent's variable's inputs = total variable cost (TVC) for j^{th} respondent.
F_{ij} = Depreciation values of equipment, annual rent for store, interest on loan, for j^{th} respondent = Total fixed cost (TFC) for j^{th} respondent.
TC =Total cost (TVC +TFC).
The marketing efficiency of watermelon was determined using Sherpherd-Futrell technique which is considered as an accurate marketing efficiency. Coefficient of marketing efficiency is the total cost of marketing to total revenue expressed in percentage term. It is specified as:

$$ME = \frac{TC}{TR} \times 100$$

Where:

ME = Coefficient of marketing efficiency,

TC = Total marketing cost incurred.
TR = Total value of product sold.

Result and Discussion

Profitability of Watermelon Marketing by the Intermediaries

The enterprise budgeting analysis was used to estimate the monthly profitability of watermelon marketing by the intermediaries as shown in Table 2. It could be seen from the table that out of the total cost of N 72, 874,423.00 spent by the wholesalers, purchases constituted 89.67% while the least expense was on off-loading (0.24%). Similarly, the retailers spent 89.61% of their total cost on purchase and 0.79% on off-loading as least expense. For the intermediaries, purchases again constituted 89.66% of the total cost of marketing while the least expenditure was offloading, 0.28%. By this result, cost of purchasing of marketing stock is the most important cost of the business while cost of off-loading the stock is the least. This result is in tandem with Ekerete (2014) and Ozor (2017) who reported that cost of stock/purchases constituted 73.21% and 94.2% of the total cost of marketing watermelon and dry maize respectively, to become the most important cost to consider in starting the marketing business.

On enterprise profitability, the wholesalers realized N 81, 455,325 after spending a total variable cost of N 72,290,850 and total cost of N 72, 874,423. This transaction generated a gross margin of N91, 644, 75. 00, net marketing income of N 85, 809, 01. 60 mean net marketing income of 0.11. The retailers on the other hand, realized gross margin of N 26,265, 07.7, net marketing income N 24, 407, 78.7 and net return on investment of 0.37. The implication of the net return on investment figures is that the wholesalers and retailers respectively return 11kobo and 37 kobo for every 1Naira invested in the business. Overall, the profitability indicators (gross margin, net marketing income, mean net marketing income and net return on investment values) showed that watermelon marketing was profitable both at the wholesale and retail levels. Ugwumba, Omojola and Orji, (2012) and Ukwuaba (2017) attested to the profitability of watermelon marketing by wholesalers and retailers in Portharcourt metropolis and Enugu State respectively.

Table 2 Estimated monthly profitability of watermelon marketing by the intermediaries

Variable	WHs	% of TC	RTs	% of TC	WH & RT	% of TC
Total Revenue TR	81455325		8950815.8		90406140.8	
Variance Cost (VC)						
Purchases	64824868	89.67	5596250	89.61	70421118	89.66
Transportation	6226350	8.61	440860	7.05	6667210	8.48
Loading	341519	0.47	105095	1.68	446614	0.56
Off-loading	176618	0.24	49641	0.79	226259	0.28
Miscellaneous cost (Recharge Card Nylon bag)	721495	0.99	53180	0.85	774675	0.98
Total Variable Cost (TVC)	72290850	99.98	6245026	99.98	78535876	99.96
Fixed Cost (FC)						
Monthly Shop rent	534977.85	91.67	106685.4	57.44	641663.25	83.40
Depreciation on Equipment (Tray, Knife, Table, Chair)	36500.5	6.25	73199.6	39.41	109700.1	14.25
Interest on Loan	12095.05.	2.07	5843.9	3.14	17938.95	2.33
Total Fixed Cost (TFC)	583573.4	99.99	185729	99.99	769302.4	99.98
Total Cost TC = TVC + TFC	72874423.4		6430755		79305178.4	
Gross Margin = TR – TVC	9164475		2626507.7		11870264.4	

Net Marketing Income NMI = GM – TFC	8580901.6	2440778.7	11100962
NMI Mean = NMI/n	78008.1	22188.8	50458.91
Return on Investment = TR/TC	1.11	1.37	1.13
Net Return on Investment NMI/TC	0.11	0.37	
Gross Ratio = TC/TR	0.89	0.71	0.87
Marketing Efficiency = TC/TR x 100/1	89%	71.84	87

Source: Field survey, 2017

Marketing efficiency of watermelon

The Shepherd-Futrel method was used to determine the co-efficient of marketing efficiency. The method expresses marketing efficiency as the ratio of total cost to total revenue expressed as percentage. The lower percentage, the better the marketing efficiency, since less proportion of the revenue will be expanded on total cost of marketing.

The model is slated as:

$$ME = \frac{TC \times 100}{TR}$$

For wholesalers:

$$ME = \frac{72874423.4 \times 100}{81455325} = 89.46\%$$

For retailers:

$$ME = \frac{6430755 \times 100}{8950815.8} = 71.84\%$$

For both wholesalers and retailers:

$$ME = \frac{79305178.4 \times 100}{90406140.8} = 87.72\%$$

Where:
ME = Marketing efficiency
TC= Total cost
TR= Total revenue

The result of the analyses revealed that none of the intermediaries attained efficiency of 100% in the marketing of watermelon implying the existence of good level of inefficiencies among the intermediaries (wholesalers and retailers). The level of inefficiency was higher (89.46%) among the wholesalers than the retailers (71.84%), implying that the retailers were more efficient in the marketing of watermelon than the wholesalers. This can be explained by the fact that most of retailers source their products from nearby markets which resulted to reduced cost. Ugwumba, Obiekwe and Ozor, (2016) confirmed that none of the intermediaries in snail marketing attained optimal efficiency of 100%. This result corroborates Isibor and Ugwumba (2013) and Ebiowei (2013) who noted that retailers of watermelon were more efficient than the wholesalers in the business. The findings is at variance with Kassali ,Aremu and Shittu, (2015), who indicated estimated efficiency ratio of 1.62 which is greater than unity in the study area which implies that the operation involved in the marketing of watermelon in Oyo State, Nigeria is efficient.

Table 3 Test of hypotheses about differences in mean net market incomes and marketing efficiency levels of the wholesalers and retailers.

Variables	No	Mean	Diff b/w mean	T	P
$MNMI_W$	120	₦78,008.1	-	-	-
$MNMI_R$	120	₦22,188.8	55819.3	3.88^{xxx}	0.000
ME_W	120	0.89	-	-	-
ME_R	120	0.73	0.16	1.74^{x}	0.021

Key Note $MNMI_W$ = Mean net marketing income, wholesalers. $MNMI_R$ = Mean net marketing income, retailers. ME_W = Marketing efficiency, wholesalers. ME_R = Marketing efficiency, retailers. T= t ratio P= Probability. ^{xxx} = Significant at 1% level. ^{x} = Significant at 10%. Source: Field survey, 201

The hypotheses, there is no statistically significant differences between net marketing incomes realized by wholesalers and retailers of watermelon was tested with t-statistic of the Two-sample T test of MINTAB statistical package.

Result of the analysis (Table 4.3) indicated that there was statistical and significant difference between the net marketing incomes realized by the wholesalers and retailers in favour of the retailers. This implied rejection of the null hypothesis of the no significant difference between the net marketing incomes and confirmation that the retailers were more efficient than the wholesalers in the business.

Constraints To Watermelon Marketing:
The constraints associated with watermelon marketing in the study area were shown in Table 4. The findings showed that wholesalers and retailers have some common challenges but some were more serious among the wholesalers than the retailers and vice versa. For the wholesalers, the problem of high cost of produce (M=3.25) was perceived as the most serious. This is in line with the findings of Ugwumba et al. (2012) who reported high purchase cost and high product price as the major constraints to watermelon marketing. Another constraint of importance to wholesalers is high cost of transportation (M=3.18). This agrees with Adekunle, Fatuobi, Adisaand andAdeyemi, (2003) who reported that adequate transportation facilities could enhance successful marketing, Osundu, Nwadike, Ijeoma, Udah and Ugboaja,(2014) reported that transportation cost constitutes the highest marketing cost in cabbage supply chain. Adugua (2009) noted that as high as 30% losses in vegetables are recorded during transportation from point of production to point of consumption in the study area.

For the retailers, high cost of produce, (M=3.01), spoilage of fruits, (M=280), unripe and over ripe ones, (M=2.70), poor storage facilities (M=2.60) loading and off-loading damage, (M=2.59) and seasonality (M=2.49) were their major constraints. This agrees with Isibor and Ugwumba (2013) who reported spoilage as one of the major constraints to watermelon and vegetable marketing.

Table 4. Constraints to watermelon marketing

Constraints	Wholesalers Mean score	Rank	Retailers Mean score	Rank
High cost of transportation	3.18	2nd	1.50	9th
High cost of produce	3.25	1st	3.01	1st
Loading and off-loading damages	3.10	3rd	2.59	5th
Poor storage facilities	2.53	5th	2.60	4th
Spoilage of fruits (perishability)	2.50	6th	2.89	2nd
Unripe and over ripe ones	2.80	4th	2.70	3rd
Seasonality	1.82	7th	2.49	6th
Inadequate capital	1.30	10th	1.70	10th
Inadequate Credit facilities	1.69	8th	2.20	7th
Bulkiness	1.11	11th	2.10	8th
Price fluctuation	1.50	9th	1.68	11th

Key Note: Mean cut off mark = 2.5. Source: Field survey, 2017.

Conclusion

Watermelon marketing in Anambra State is a profitable venture both at the wholesale and retail levels, given the positive values of gross margin, net marketing income, mean net marketing income and return on investment. The marketing efficiency gave coefficients of 89% and 72.57% for wholesalers and retailers respectively implying that the retailers were operationally more efficient in the business than the wholesalers since they expended less of their sales revenue on cost. The marketers were efficient in the business although inefficiencies still existed among their activities due to marketing constraints. The major constraints identified are high cost of the stock, high transportation, loading and off-loading damages on the wholesale level while high cost of produce, spoilage of fruits (perishability), unripe and over ripe ones on the retail level. The level of profitability would improve if adequate measures are taken by marketers of necessity to convey watermelon using cooling van to avoid spoilage of the fruits via transportation and also there is a need for market union and members of cooperatives to provide modern storage facilities that

will reduce losses due to product deterioration in storage.

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