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A Comparative Analysis on Marketing Efficiency of Raphia and Oil Palm Wine in South East, Nigeria

Temple Nwankwo[1] and Uche Okeke[2*]

[1]Department of Agricultural Economics and Extension, Faculty of Agriculture and Food Technology, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.
[2]Department of Agricultural Economics and Extension, Faculty of Agriculture, Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus, Anambra State, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The study compared the marketing efficiency of oil palm wine (OPW) and raphia palm wine (RPW) in South East, Nigeria. The study specifically described the marketing channels of OPW and RPW, determined the market structure, and ascertained the profitability and efficiency of OPW and RPW marketing by the intermediaries. It also estimated the determinants of profit realized by OPW and RPW marketers; and identified the problems of palm wine marketing in the area. Multi-stage sampling method was used to select 240 respondents. Primary and time series data were collected using structured questionnaire administered to the respondents by personal interview. Descriptive and parametric statistics involving enterprise budgeting and multiple regression techniques were used for data analyses. Results identified five marketing channels for palm wine in the area. Gini coefficient analysis gave concentration ratios of 0.19 and 0.44 for OPW and RPW wholesalers; 0.48 and 0.08 for OPW and RPW retailers respectively, implying a fairly competitive market. Palm wine marketing was profitable in the area given the positive values of gross margin, net marketing income, mean net marketing income, and net return on investment of N5,025,872, N4,980,976.03,

**Corresponding author: E-mail: victorokeke76@gmail.com;*

N41,508 and 0.37 for OPW; N3,640,020, N3,614,966.88, N30,124.72 and 0.96 for RPW. RPW was more profitable than OPW because it returned 96 kobo against the 37 kobo returned by OPW for every N1.00 investment. Purchase and selling prices, transportation cost, and marketing cost statistically and significantly influenced pooled OPW and RPW marketers' profit; marketing cost, purchase and selling prices were common significant determinants of profit realized by the wholesalers of OPW and RPW while selling price was the only common significant determinant of profit realized by the retailers of OPW and RPW. The constraints to palm wine marketing arranged in descending order of seriousness were high cost of transportation, scarcity of modern storage facilities, low shelf life of the product, seasonality of supply, poor patronage, high cost of palm wine, adulteration, and price instability. The establishment of small scale palm wine bottling industries through private initiatives would extend the products' shelf-life, and make it available all year round. Government in collaboration with private initiatives should provide modern transportation, and market infrastructural facilities as well as soft loans, to enable the marketers operate at minimal cost, earn more profit in conducive environment and good health.

Keywords: Comparative; marketing; oil palm wine; raphia palm wine; constraints; Southeast; Nigeria.

1. INTRODUCTION AND BACKGROUND OF THE STUDY

Human beings cannot survive without water for a long period of time, as normal functioning of the body requires a continual supply of fluid in various forms including beverages [1]. Beverages are food items that are consumed in liquid state, but have lower food values relative to milk and milk products. Two categories may readily be recognized: non-alcoholic and alcoholic beverage drinks [2]. In Nigeria, various types of alcoholic beverages are consumed which range from beer to wine and spirit categories. Some of the alcoholic beverages traditionally produced include *burukutu, pito, ogogoro* and palm wine [3].

Oil palm and raffia palm trees are the most popular in Nigeria. Oil palm (*Elaeis guineensis* Jacq.) originated in the tropical rain forest region of West Africa. The main belt runs through the southern latitudes of Cameroon, Cote d'Ivoire, Ghana, Liberia, Nigeria, Sierra Leone, Togo and into the equatorial region of Angola and the Congo [4]; while raphia palm is found from Gambia through the Guinea forest zone of West Africa to Cameroon, Gabon and Congo and possibly to Angola [5].

Palm wine is the collective name for a group of alcoholic beverages produced by the natural fermentation of the sap obtained from various tropical plants of the Palmae family [6]. Indigenous people living in or close to swampy Areas (e.g the Urhobos, Ijaws, Itsekiris of Nigeria) prefer to tap their palm wine from raffia palm, while the Ibos prefer tapping their wine from oil palm trees. The wine obtained from oil palm trees is called oil palm wine (OPW) while the palm wine obtained from raphia palm trees is called raphia palm wine (RPW) [7].

1.1 Objectives of the Study

The broad objective of this study compared the marketing of OPW and RPW in South East, Nigeria. The specific objectives are to;

i. Describe the marketing channelof palm wine;
ii. Determines the market structure;
iii. Determine the profitability of OPW and RPW marketing by the intermediaries;
iv. Examine the determinant of profit realized by OPW and RPW marketers; and
v. Identify the constraints of palm wine marketing.

1.2 Hypotheses

The following null hypotheses guided the study;

i. Palm wine markets are not integrated; and
ii. Net marketing incomes realized by OPW and RPW marketers are not significantly influenced by their socio-economic factors namely gender, age, marital status, house hold size, educational level, marketing experience, purchase price, selling price, total fixed cost, transportation cost, and marketing cost.

2. METHODOLOGY

2.1 Area of Study

The study was carried out in South - East, Nigeria. It is located at longitude 7°00'00" East

and latitude 6°20'00" North (Nigeria Meteorological Agency, 2010). Anambra State has an estimated population of 2, 117, 984 males and 2,059,844 females and occupies an area of 4,816.21 square kilometers with a population density of 867.4 (National Population Census (N.P.C), 2006). In the study area, the temperature range from 21° - 30°C. The study location experiences rainy season and dry season from March to November and December to February respectively.

2.2 Population and Sampling Procedure

The population for the study was all the oil palm wine and raphia palm wine marketers in South East, Nigeria. Multistage random sampling technique was used in selecting respondents for the study. In stage I, three states were randomly selected from the five States that constitute the South East, Nigeria. Stage II, comprised a random selection of two LGAs from each State (six LGAs). Stage III involved a random selection of two palm wine markets from each of the selected LGAs (twelve markets). In stage IV, a random selection of five wholesalers and five retailers made from each market for both oil and raphia palm wines respectively were selected making a total sample size of 240 respondents.

2.3 Methods of Data Collection

Primary data was used for the study. A structured questionnaire was constructed to capture both qualitative and quantitative data. These questionnaires were consisted of both open and closed ended questions. These sets of structured questionnaire were administered to the respondents (wholesalers and retailers) in the form of personal interview where questions were interpreted in the local language and responses carefully recorded.

2.4 Measurement of Variables

Variables that was used in the study include; years of experience in palm wine tapping, age of the marketer, gender, household size, marital status, educational level, marketing experience, marketing costs, product price, constraints and potentials to palm wine marketing.

2.5 Methods of Data Analysis

Percentages and flowchart was used to realize objective I and part of objectives II and III. Part of objective II (market structure) was achieved using Gini coefficient, while enterprise budgeting was used to achieve objective III while objective IV was realized using multiple regression analysis. Also, part of objective V (constraints) was realized using factor analysis.

2.6 Model Specification

2.6.1 Determination of channel efficiency

Ugwumba and Okoh (2010) used Shepherd formular to analyze marketing channel efficiency of catfish in Anambra State, Nigeria and this study adopted this method to analyze the channel efficiency of OPW and RPW markets.

The Sherpherd's formular for marketing efficiency is given as:

$$ME = \frac{TC}{TR} \times \frac{100}{1}$$

Where:

ME = Coefficient of marketing efficiency
TC = Total cost incured by the marketers (N).
TR= Total revenue of the product sold (N).

2.6.2 Determination of market structure

Market structure will be determined using Gini coefficient, it is expressed as: $GC=1-\sum XY$

Where,

GC = Gini Coefficient,
X= Proportion of palm wine sellers
Y= Cumulative proportion of palm wine sellers
∑= Summation sign (Iheanacho, 2005). The value of GC varies from zero to one and the higher the coefficient, the higher the concentration, hence, the higher the inefficiency in the market structure. GC values greater than 0.5 indicated inequalities while 0.2 to 0.35 show equitable distribution.

2.6.3 Analysis of profitability and efficiency

Budgetary technique and Shepherd Futrell method were used. Shepherd Futrell model is specified as:

$$ME = \frac{TC}{TR} \times \frac{100}{1}$$

2.6.4 Gross margin

GM = TR-TVC

Where,

GM = gross margin
TR = total revenue
TVC = total variable cost

2.6.5 Net Return on investment (NROI)

$$NROI = \frac{TRMA}{TCMA}$$

Where;

NROI = Rate of Return Per naira Invested
TRMA = Total Revenue by specific agency (wholesalers and retailers)
TCMA = Total Cost incurred by specific agency (wholesalers and retailers

2.7 Determinants of Profitability

Multiple regression model specification: The multiple regressions were used to examine how the socio-economic factors of the respondents affected the profit realized by them. The model used is implicitly expressed as:

NMI=f (AGE, GEN, MTS, HHS, EDU, EXP, PUP, SEP, TFC, TPC, MKC; ei)

Where:

NMI = Net marketing income (OPW and RPW) (₦);
AGE = Age of marketer (years);
GEN = Gender (dummy: male = 1.001; female =0.001);
MTS = Marital status (dummy: married=l.001; otherwise =0.001);
HHS = Household size (number of persons in a household);
EDU = Educational level (years of formal education);
EXP = Marketing experience in the business (years);
PUP = Purchase price (₦);
SEP = Selling price (₦);
TFC = Total fixed cost (₦);
TPC = Transport cost (₦);
MKC = Marketing cost (₦); and
e_i = Error term.

Four functional forms of the regression model (linear, exponential, semi-log and double-log) were tried with data on socio-economic factors and net marketing income of the marketers. Output of the form with best result according to econometric *a priori* criteria was adopted as the lead equation. The explicit versions of the functional forms are stated as:

Linear: $NMI = \beta_0 + \beta_1 AGE + \beta_2 GEN + \beta_3 MTS + \beta_4 HHS + \beta_5 EDU + \beta_6 EXP + \beta_7 PUP + \beta_8 SEP + \beta_9 TFC + \beta_{10} TPC + \beta_{11} MKC + e_i$

Exponential: $\ln NMI = \beta_0 + \beta_1 AGE + \beta_2 GEN + \beta_3 MTS + \beta_4 HHS + \beta_5 EDU + \beta_6 EXP + \beta_7 PUP + \beta_8 SEP + \beta_9 TFC + \beta_{10} TPC + \beta_{11} MKC + e_i$

Semi-log: $NMI = \beta_o + \beta_1 \ln AGE + \beta_2 \ln GEN + \beta_3 \ln MTS + \beta_4 \ln HHS + \beta_5 \ln EDU + p_6 \ln EXP + p_7 \ln PUP + p_8 \ln SEP + pg \ln TFC + p_9 \ln TPC + p_9 \ln MKC + 6i$

Double-log: $\ln Nmi = \beta_o + \beta_1 \ln AGE + \beta_2 \ln GEN + \beta_3 \ln MTS + \beta_4 \ln HHS + \beta_5 \ln EDU + \beta_6 \ln EXP + \beta_7 \ln PUP + \beta_8 \ln SEP + \beta_9 \ln TFC + \beta_9 \ln TPC + \beta_9 \ln MKC + ei$

The ordinary and transformed values of the dependent and independent variables were fitted into the respective models and analyzed using the MINITAB statistical package. The regression output which produced the best result in terms of number of significant parameters, values of F-statistic, coefficient of multiple determination (R^2) and Durbin-Watson statistic was chosen as the lead equation.

3. RESULTS AND DISCUSSION

The result of the analysis was discussed under the following sub-headings; palm marketing channels, palm wine market structure; profitability; determinants of marketers profit and constraints to marketing of palm wine.

3.1 Description of Palm Wine Marketing Channels

In the present study, marketing channel refers to the collection of agencies and movements associated with the exchange of palm wine from the tappers to the ultimate consumer. The market participants involved in palm wine marketing system in south east Nigeria are tappers, wholesalers, retailers, and distillers. Four outlets from tappers were identified as shown in Table 1. The main receivers from tappers were wholesalers (60%), retailers 30%, consumers (9%) and distillers (1%). This implied that producers/ tappers were mostly patronized by the wholesalers due to the need for quick disposal of the product in its fresh condition to avoid wastage and loss of revenue.

Table 1. Tappers' palm wine market outlets

Market outlet through actors	Percentage(%) of palm wine volume traded
Wholesalers	60
Retailers	30
Consumers	9
Distillers	1

Source: Field survey, 2017

Five channels of selling palm wine were identified in Southeastern Nigeria. The marketing channels identified were;

i. Tappers—> consumers (8%)
ii. Tappers —> wholesalers —> consumers (60%)
iii. Tappers —» retailers —>consumers (30%)
iv. Tappers -» retailers -local gin distillers ->consumers (1%)
v. Tappers —» wholesalers -» retailers — consumers (1%)

3.2 Determination of Marketing Structure

Market structure refers to those organizational characteristics of a market that exercise strategic control on the nature of competition and behavior within the markets [8]. Gini coefficient and Herfindahl index (HHI) were used to measure the market structure of palm wine marketing.

3.3 Gini Coefficient and Hirschman-Herfindahl Index (HHI) for OPW and RPW Wholesalers

It could also be observed that the wholesalers recorded a low Gini Coefficient of 0.19 and HHI of 0.81 for OPW and 0.44 and 0.25 for RPW (Tables 2 and 3). The low Gini coefficient and HHI values implied that there was no marketer among the OPW and RPW wholesalers that had the largest share in the palm wine business as to have influence whatsoever on the market price of his product through his own decisions or actions, hence the market was fairly competitive.

3.4 Gini Coefficient and Hirschman-Herfindahl Index (HHI) for OPW and RPW Retailers

Also, the concentration for the OPW and RPW retailers as reported in Tables 4 and 5 revealed Gini coefficient and HHI of 0.48 and 0.23 for OPW and for RPW, 0.08 and 0.84. This result showed that retailers of OPW had higher value of Gini coefficient when compared to retailers while the HHI value for RPW was higher than that of OPW. The results implied that there were many small sizes of raphia palm wine retailers in the market than OPW market, that none could influence the price. This finding contradicts with Adakaren [9] which reported a lower Gini coefficient of 0.6331 for RPW retailers. Overall, the major characteristic of OPR/RPW markets was the participation of many buyers and sellers with none dominating the market. Thus, OPW/RPW markets did not exhibit the characteristics of monopoly but had features of near competitive market although there were traits of inefficiencies and competitive market behavior.

3.5 Profitability and Efficiency of OPW and RPW Marketing

The enterprise budgeting analysis was employed to determine the profitability of OPW and RPW marketing. The marketers incurred various costs in the course of palm wine marketing. These is shown in Table 6. The marketers selling OPW spent ₦13,246,658 on variable cost and ₦44,895.97 total fixed cost making a total cost of ₦13,291,553.97. For RPW, the marketers spent ₦ 17,796,354.53 as total variable cost and ₦69,985.01 as total fixed cost making atotal cost of ₦17,866,539.54.

The marketers of OPW made a gross margin, net marketing income, mean net marketing income and net return of ₦ 5,055,872, ₦4,980,976.03, ₦41,508.13, 0,37 respectively. These is shown in Table 7. For RPW, the marketers made gross margin, net marketing income, mean marketing income and net return on investment of ₦3,640,020, ₦3,614,966.88, ₦30,124.72 and 0.96 respectively. It shows that the marketers of OPW made 37 Kobo for every ₦1 spent and for RPW, the marketers made 96 Kobo for every ₦1 spent. It shows that RPW is more profitable.

3.6 Marketing Efficiency of Palm Wine in the Southeast

A marketing system is efficient if the calculated marketing efficiency value is equal to one or 100%. Shepherd-Futrell method was used to compute the co-efficient of marketing efficiency which is expressed as the ratio of total cost to total revenue expressed in percentage. The formula is stated as:

$$ME = \frac{TC}{TR} \times \frac{100}{1} \quad (1)$$

Table 2. Gini coefficient and Herfindahl- Hirschman index for OPW wholesalers

Monthly sales	Number of wholesalers	Proportion of wholesalers (PO)	Cumulative proportion of wholesalers	Total monthly sales (W)	Proportion of total sales (Si)	Cummulative proportion of total sales (CO)	PiCi	Si^2
81,000-100,000	1	0.0167	0.0167	97,500	0.0069	0.0069	0.0001	0.0000
101,000-120,000	4	0.0667	0.0834	444,800	0.0318	0.0387	0.0026	0.0010
121,000-140,000	7	0.1167	0.2001	932,220	0.0666	0.1053	0.0123	0.0044
> 140,000	48	0.8000	1.0001	12,518,850	0.8946	0.9999	0.7999	0.8003
Total	60	1.0001	1.4506	13,993,370	0.9999	1.1508	0.8149	0.8057
GC = I-∑ PiG =	1-0.8149=0.19							$\sum Si^2$=HHI

Source: Field Survey, 2017

Table 3. Gini coefficient and Herfindahl-Hirschman index for RPW wholesalers

Monthly sales	Number of wholesalers	Proportion of wholesalers (PO)	Cumulative proportion of sellers	Total monthly sales *@i)*	Proportion of total sales (Si)	Cummulative proportion of total sales (Ci)	PiG	Si^2
<4 1,000-60,000	12	0.2000	0.2000	652,900	0.1354	0.1354	0.0271	0.0183
61,000-80,000	21	0.3500	0.5500	1,509,400	0.3131	0.4485	0.1569	0.00980
81,000-100,000	18	0.3000	0.8500	1,639,120	0.3399	0.7884	0.2365	1.1155
101,000-120,000	7	0.1167	0.9667	766,150	0.1589	0.9473	0.1105	0.0252
> 121,000	2	0.0333	1.0000	253,500	0.0526	0.9999	0.0333	0.0028
Total	60	1.000	3.5667	4,821,070	0.9999	3.3195	0.5643	0.2598
GC = 1 - ∑ PiG =	= 1-0.5643 = 0.44							$\sum Si^2$=HHI

Source: Field survey, 2017

Table 4. Gini coefficient and Herfindahl-Hirschman index for OPW retailers

Monthly sales	Number of retailers	Proportion of retailers (Pi)	Cumulative proportion of retailers	Total monthly sales (N)	Proportion of total sales (Si)	Cumulative proportion of total sales (Ci)	PiCi	Si^2
<4 1,000-60,000	31	0.5167	0.5167	1,445,300	0.3378	0.3378	0.1745	0.1141
61,000-80,000	10	0.1667	0.6834	708,300	0.1655	0.5033	0.0839	0.0274
81,000-100,000	12	0.2000	0.8834	1,054,360	0.2464	0.7497	0.1499	0.0607
101,000-120,000	2	0.0333	0.9167	212,500	0.0497	0.7994	0.0266	0.0025
121,000-140,000	1	0.0167	0.9334	126,000	0.0294	0.8288	0.0138	0.0009
> 140,000	4	0.0667	1.0001	732,700	0.1712	1.0000	0.0667	0.0293
Total	60	1.1504	4.9337	1.000	4.219	4.219	0.5154	0.2349
GC = 1- E PiCi = 0.5154=0.4846=0.48								∑S,*=HT¥f

Source: Field survey, 2017

Table 5. Gini coefficient and Herfindahl-Hirschman index for RPW retailers

Monthly sales	Number of retailers	Proportion of retailers (Pi)	Cumulative proportion of retailers	Total monthly sales (N)	Proportion total sales (Si)	Cumulative of proportion of total sales (G)	PiCi	Si^2
<4 1,000-60,000	57	0.9500	0.9500	2,308,550	0.9148	0.9148	0.8691	0.8369
61,000-80,000	2	0.0333	0.9833	129,500	0.0513	0.9661	0.0322	0.0026
81,000-100,000	1	0.0167	1.0000	85,500	0.0339	1.0000	0.0167	0.0011
Total	60	1.0000	2.9333	2,523,550	1.0000	1.0339	0.9180	0.8406
GC =1-2 PiCi = 1- 0.918 = 0.08								$\sum Si^2$=HHI

Source: Field survey, 2017

Table 6. Estimated cost structure of the palm wine marketers

Parameters	Wholesalers Amount @t)	OPW retailers & RT amount (N)	WH (%)	Wholesalers amount (N)		RPW retailers amount (N)	WH&RT	All marketers (%) amount (W)		(%)
Purchases	9,684,600	3,327,250	13,011,850	97.52	2,201,160	1,248,190	3,449,350	95.26	16,461,200	96.29
Transportation	73,780	48,560	122,340	0.92	100,250	49,350	149,600	4.13	271,940	1.59
Ground levy	2,650	1,815	4,465	0.03					4,465	0.03
Cost of mkt. Info	20,450	14,970	35,420	0.27	6,050	40,450	76,500	2.11	111,920	0.65
Govt. Levy	360	700	1,060	0.01					1,060	0.01
Cost of Spillage	33,550	56,440	39,194	0.29	52,150		52,150	1.39	91,3440	0.53
Association dues	24,320	8,009	32,329	0.24					32,329	0.19
Total variable costs (TVC)	9,839,710	3,457,744	13,246,658	99.28	2,359610	1,337,990	3,727,600	102.89	17,796,354.53	99.29
Fixed costs										
Dep. on gallons	4,394.70	5,142.01	9,536.71	0.07	6216.7	2,050.96	8,267.66	0.23	17,804.37	0.10
Dep. on cups	2,166.80	3,212.10	5,378.90	0.04	4929	1,575.77	6,504.77	0.18	11,919.67	0.07
Dep. on funnels	2,053.56	1,885.60	3,939.16	0.03	3925	65.42	3,990.42	0.11	7,929.58	0.05
Dep. on Table	360	2,510.70	2,870.70	0.02	1,127.1	1,176.83	2,303.93	0.06	5,174.63	0.03
Dep. on Chairs	815.80	16,846.61	7,662.40	0.16	2269.4	1,407.08	3,676.48	0.10	11,338.88	0.07
Dep. on Shop rent	12,150.10	3,358	15,508.10	0.12	_	309.86	309.86	0.01	15,817.96	0.09
Total fixed cost										
TFC TC	21,940.96	32,955.02	44,895.97	0.44	18,467.20	6,585.92	25,053.12	0.69	69,985.09	0.41
(TFC+TVC)	9,861,650.96	3,490,699.02	13,291,553.97	99.72	2,378,077.20	1,344,575.92	3,752,653.12	103.58	17,866439.62	99,7

Note: Dep. = depreciation, % = percentage. Source: Field survey, 2017

Table 7. Estimated profit for palm wine marketing in South East, Nigeria

Parameters amount (N)	wholesalers	OPW retailers amount (N)	WH & RT	(%)	Wholesalers amount (N)	RPW retailers amount (W)	WH & RT		All marketers (%) Amount (W)	
Revenue	13,993,370	4,279,160	18,272,530		4,821,070	2,546,550	7,367,620		25,640,150	
Variable costs										
Purchases	9,684,600	3,327,250	13,011,850	97.52	2,201,160	1,248,190	3,449,350	95.26	16,461,200	96.29
Transportation	73,780	48,560	122,340	0.92	100,250	49,350	149,600	4.13	271,940	1.59
Ground levy	2,650	1,815	4,465	0.03					4,465	0.03
Cost of mkt. Info	20,450	14,970	35,420	0.27	6,050	40,450	76,500	2.11	111,920	0.65
Govt. Levy	360	700	1,060	0.01					1,060	0.01
Cost of Spillage	33,550	56,440	39,194	0.29	52,150		52,150	1.39	91,3440.53	0.53
Association dues	24,320	8,009	32,329	0.24					32,329	0.19
Total variable costs										
(TVC)	9,839,710	3,457,744	13,246,658	99.28	2,359,610	1,337,990	3,727,600	102.89	17,796,354.53	99.59
Fixed costs										
Dep. on gallons	4,394.70	5,142.01	9,536.71	0.07	6216.7	2,050.96	8,267.66	0.23	17,804.37	0.10
Dep. on cup	2,166.80	3,212.10	5,378.90	0.04	4929	1,575.77	6,504.77	0.18	11,919.67	0.07
Dep. on funnels	2,053.56	1,885.60	3,939.16	0.03	3925	65.42	3,990.42	0.11	7,929.58	0.05
Dep. on Table	360	2,510.70	2,870.70	0.02	1,127.1	1,176.83	2,303.93	0.06	5,174.63	0.03
Dep. on Chairs	815.80	16,846.61	7,662.40	0.16	2269.4	1,407.08	3,676.48	0.10	11,338.88	0.07
Dep. on Shop rent	12,150.10	3,358	15,508.10	0.12		309.86	309.86	0.01	15,817.96	0.09
Total fixed cost										
(TFC)	21,940.96	32,955.02	44,895.97	0.44	18,467.20	6,585.92	25,053.12	0.69	69,985.01	0.41
Total cost (TC)										
(TFC+TVC)	9,861,650.96	3,490,699.02	13,291,553.97	99.72	2,378,077.20	1,344,575.92	3,752,653.12	103.58	17,866,539.54	99.7
GM(TR-TVC)	4,153,660	821,416	5,025,872		2,461,460	1,208,560	3,640,020		7,843,795.47	
NMI (GM-TFC)	4,131,719.04	788,460.98	4,980,976.03		2,442,992.8	1,201,974.08	3,614,966.88		7,773,810.38	
MNMI = NMI/n	68,861.98	13,141.02	41,508.13		40,716.55	20,032.90	30,124.72		32,390.88	
NROI = NMI/TC	0.42	0.23	0.37		1.03	0.89	0.96		0.44	
ME (TC/TRxl0O)	70.47	81.57	72.74		49.33	52.79	50.93		69.68	

Note: Dep. = depreciation, % = percentage. Source: Field survey, 2017

Result of analysis of marketing efficiency levels attained by the intermediaries (wholesalers and retailers) in the area (Table 7) indicated that the wholesalers attained marketing efficiency levels of 70.47% for OPW, and 52.79% for the RPW while the retailers' marketing efficiency levels for OPW and RPW were 81.57% and 50.93% respectively. By this result, the retailers were more efficient in palm wine marketing than the wholesalers because they expended less of their sales revenue on cost.

3.7 Determinants of Profit Realized by OPW and RPW Marketers

The multiple regression analysis was adopted to estimate the effects of socio-economic factors of the respondents (predictors) on marketers' profit (predictand). The predictors used were age of the marketers represented by (AGE), gender (GEN), marital status represented by (MAS), household size (HHS), educational level (EDU), marketing experience (EXP), purchase price (PUP), sale price (SEP), total fixed cost (TFC), transport cost (TPC), and marketing cost (MKC). Four functional forms of the regression model (linear, exponential, semi-log and double-log) were fitted with the data and ran using the MINITAB statistical package. Outputs of the exponential regression analyses for OPW and RPW (Tables 8, 9, 10, 11) gave the best results in terms of values of the coefficients, R^2, adjusted R^2, and Durbin-Watson statistic and appropriateness of signs of the regression coefficients, and were therefore chosen as the lead equations. For the OPW and RPW wholesalers, the regression equations are given as:

NMI (OPW wholesalers) = 0.06 + 0.162AGE + 0.0103GEN - 0.0153MTS - 0.0026HHS + 0.0092EDU - 0.0196EXP -2.71 PUP + 2.36SEP + 0.0072TFC - 0.212TPC

NMI (OPW wholesalers) = -7.12 + 0.724AGE + 0.0380GEN + 0.140MTS -0.220HHS - 0.0148EDU + 0.200EXP -1.83PUP + 4.11SEP + 0.101TFC - 0.0116TPC

A total of eleven regressors were included in the models. Three variables (purchase price, selling price and marketing cost) statistically and significantly influenced the profit of RPW wholesalers while four variables (purchase price, selling price, transport cost, and marketing cost) statistically and significantly influenced the profit of OPW wholesalers. The remaining seven variables (age, gender, marital status, household size, educational level, experience and total fixed cost) were not significant. Among the statistically significant variables, selling price and marketing cost exerted positive influence on the net marketing income while the impact of purchase price of palm wine and transport cost were negative for both palm wines. Then, age, gender, marital status, household size, educational level, experience and total fixed cost were not significant.

For both OPW and RPW wholesalers, the coefficients of purchase price of palm wine were negative and statistically significant at 1% and 5% levels of probability respectively. This implied that the wholesalers who purchased the product at higher prices had their marketing cost increased and consequently earned lower net marketing income. In other words, higher the price of palm wine, higher the marketing cost and invariably lower the wholesalers' profit. It also showed that higher the purchase price, lower the quantity demanded by the wholesalers as well as profit they realized.

The coefficient of selling price had a positive and statistically significant influence on the wholesalers' profit, meaning that the higher the selling prices of both OPW and RPW, higher the quantities the wholesalers would supply so as to earn higher profit. This implied that the wholesalers of OPW and RPW who were able to supply more palm wine at higher prices were likely to realize more profit. The coefficient for cost of transportation was negative and statistically significant of 5% probability level. This signifies that higher the cost of transportation, lower the volume of wine that will be supplied especially to the urban area. The implication is that they often sell their palm wine at a reduced price in the rural markets instead of transporting it to the urban market where it will fetch higher prices. This finding agrees with Adinya et al. [10] who revealed that transportation had the highest impact on the returns of palm wine sellers in Uyo. The coefficient of marketing cost had a positive and statistically significant influence on the wholesalers' profit. This is contrary to *a priori* expectation, but implied that wholesalers who had their marketing costs increased by increasing their investment in the business earned higher profits as a result of the action. The reason for the positive relationship could also be because wholesalers buy palm wine in

bulk, they incur low costs and increase their profit. This is in agreement with the findings of Ugwumba and Onwuemedo [11] that reported positive relationship between net marketing income and marketing cost. Four predictors, selling price, the purchase price, transport cost and marketing cost significantly influenced the retailers' profit. For the retailers of OPW and RPW, the results of the multiple regression analyses are presented in Tables 10 and 11 respectively. The equations are given as:

NMI (OPW retailers) = -1.95 + 0.240AGE - 0.0049GEN + 0.133MTS -0.169HHS 0.0579EDU - 0.0307EXP +0.381PUP + 1.93Sep - 0.0354TFG + 0.274TPC

NMI (RPW retailers) =3.85 + 0.027AGE + 0.0077GEN - 0.0289MTS + 0.0065HHS- 0.0008EDU- 0.0343EXP -1.17PUP + 0.110SEP - 0.0448TFC-0.645TPC

The coefficients of selling price and transportation cost were positive and statistically significant at the 1% level. This implied that the higher the selling price, the higher the revenue realized by the retailers. Also, the transportation cost had a positive influence on the retailers' profit. The reason could be attributed to search for palm wine by the retailers in rural and cheaper areas so as to make greater profit. The result gave Durbin- Watson value of 2.2 implying that autocorrelation as absent amongst the values of the variables.

Table 8. Determinants of OPW wholesalers' profit

Predictor	Coef	StDev	T	P
Constant	-71230	2.3480	3.03	0.005
AGE	0.7240.	0.6895	1.05	0.303
GEN	-0.0379	0.0258	-1.47	0.154
MTS	0.1403	0.1475	0.95	0.350
HHS	-0.2202	0.2086	-1.06	0.300
EDU	-0.0147	0.0674	-0.22	0.828
EXP	0.2001	0.1550	1.29	0.207
PUP	-1.8334	0.8172	-2.24**	0.003
SEP	4.1129	0.7893	5.21***	0.000
				>
TFC	0.1009	0.08944	1.13	0.268
TPC	-0.0115	0.0478	-0.24	0.811
MKC	0.5242	0.2618	2.00***	0.055

Note: R-Sq = 71.5%, R-Sq(adj) = 60.4, F-statistic =6.40, Durbin- Watson statistic = 1.62.*
****=Significant at 5% level. **=Significant at 1% level*
Source: Field survey, 2017

Table 9. Determinants of RPW wholesalers ' profit

Predictor	Coef	StDev	T	P
Constant	-0.0620	1.0110	-1.06	0.951
AGE	0.1624	0.2300	0.71	0.484
GEN	0.0102	0.0104	0.98	0.330
MTS	-0.0153	0.0653	-0.23	0.816
HHS	-0.0025	0.0887	-0.03	0.977
EDU	0.0091	0.0186	0.49	0.624
EXP	-0.0195	0.0642	-0.30	0.762
PUP	-2.7148	0.2343	-1 1.59***	0.000
SEP	2.3561	0.1990	11.84***	0.000
TFC	0.0072	0.0617	0.12	0.907
TPC	-0.2116	0.0743	-2.85***	0.006
MKC	1.1162	0.2565	4.35***	0.000

Note: R-Sq=87.6%, R-Sq (adj) = 84.7%, F-statistic = 30.74, Durbin-Watson statistic =1.92.
****=Significant at 5% level. Source: Field survey, 2017*

A comparative analysis of the determinants showed that both OPW and RPW marketers' profit are determined by purchase and selling prices of palm wine, transportation cost, and marketing cost. Also, socio-economic factors did not influence both OPW and RPW marketers' profit. This finding is in line with Aiyeloja, Oyadele and Tumulo [12] who reported that demographic characteristics such as age, sex, marital status and educational qualification have no influence on the profitability of the Raphia wine in Sapele. On the contrary, this finding disagrees with Nwibo, Odoh and Igberi [13] who reported that gender and marital status of the marketers of palm wine were negatively related to their profit indicating an inverse relationship between these variables and the profit of the marketers.

Furthermore, the coefficient of multiple determination of 0.681 showed that 68.1% of the variation in the profit of RPW retailers was accounted for by variations in the independent variables. The F value of 9.34 was statistically significant at 5% level of probability. This signified that the explanatory variables together significantly influenced the RPW retailers' profit and that the regression model was a good fit. Durbin- Watson statistic of 2.08 implied the non-existence of autocorrelation.

Table 10. Estimated determinants of profit for OPW retailers

Predictor	Coefficient	Standard error	t	P
Constant	-1.9540	1.1980	-1.63	0.109
AGE	0.2396	0.2999	0.80	0.428
GEN	-0.0048	0.0131	-0.37	0.713
MTS	0.1328	0.0853	1.56	0.126
HHS	-0.1690	0.1108	-1.52	0.134
EDU	0.0579	0.0485	1.19	0.239
EXP	-0.0307	0.0792	-0.39	0.700
PUP	0.0380	0.0416	0.91	0.365
SEP	0.1926	0.3555	5 42***	0.000
TFC	-0.0354	0.0465	-0.76	0.450
TPC	0.2735	0.0862	3.17**	0.003
MKC	-0.2235	0.1465	-1.53	0.134

Source: Field survey, 2017

Notes: R-Sq = 54.5%, R-Sq (adj) = 44.1%, F-statistic = 5.23, Durbin -Watson statistic =2.2.
***=Significant at 5% level, ***=Significant at 1% level*

Table 11. Estimated determinants of profit for RPW retailers

Predictor	Coefficient	Standard error	t	P
Constant	3.8530	0.9776	3.94	0.000
AGE	0.0271	0.1991	0.14	0.892
GEN	0.0076	0.0101	0.75	0.454
MTS	-0.0288	0.0629	-0.46	0.648
HHS	0.0064	0.0224	0.29	0.774
EDU	-0.0008	0.0261	-0.03	0.975
EXP	-0.0343	0.0499	-0.69	0.496
PUP	-1.1707	0.3912	.2.99***	0.004
SEP	0.1099	0.0492	2.23**	0.030
TFC	-0.0448	0.0475	-0.94	0.350
TPC	0.0645	0.0571	1.13	0.264
MKC	0.7241	0.4240	1.71*	0.094

Source: Field survey, 2017

Notes: R-Sq = 68.1%, R-Sq adj = 60.8%, F-statistic = 9.34, Durbin- Watson statistic =2.08.
*** = Significant at 5% level, ***=Significant at 1% level, *=Significant at 10% level*

Table12. Constraints to palm wine marketing

Wholesalers Constraints	Mean	Rank	Retailers Constraints	Mean	Rank
High cost of transportation	2.6	1st	High cost of palm wine	2.7	1st
Scarcity of modern storage					
facilities	2.5	2nd	Adulteration	2.6	2nd
Low shelf life	2.3	3rd	Poor patronage	2.5	3rd
Seasonality of supply	2 .3	4th	Price instability	1.8	4th
Poor patronage	2.0	5th	Low Shelf life	1.6	5th
High cost of palm wine	1.7	6th	Seasonality of supply	1.2	6th
Inadequate finance	1.5	7th	High cost of transportation	0.7	7th

Source: Field survey, 2017

3.8 Constraints of Palm Wine Marketing

The palm wine marketers experienced one problem or the other in the course of running their businesses. Result of analysis of data is shown in Table 12. The table indicated that the most serious problem encountered by the marketers was high cost of transportation (M=2.6) for wholesaler. Bad poor accessibility of roads especially during the wet season leads to high cost of transportation which is viewed as a stumbling block in palm wine marketing. This study disagrees with Nwibo, Odoh and Igberi [13] who identified poor patronage, weather variation, and seasonality of supply as the major constraints to palm wine marketing in the area. The study is in tandem with Omofonwam et al. [14] who reported that high cost of transportation was a major constraint to palm wine marketing in Edo State of Nigeria.

The table also shows that wholesalers considered lack of storage facilities (M=2.5) and low shelf life (M=2.3) as serious constraints in palm wine market. Other moderately serious problems were seasonality of supply (M=2.3), poor patronage (M=2.0), high cost of palm wine (M=1.7), and inadequate finance (M=1.5).

On the side of the retailers, it was found out that high cost of palm wine (M=2.7), Adulteration (M=2.6), poor patronage (M=2.5), price instability (M=1.8), low shelf life (M=1.6) is the most serious constraint followed by seasonality of supply (M=1.2) and high cost of transportation (M=0.7) as hindrances to palm wine marketing.

4. SUMMARY, CONCLUSION AND RECOMMENDATIONS

The broad objective of the study was to compare OPW and RPW marketing in South East, Nigeria. Multi-stage sampling method was used to select 240 respondents (120 wholesalers and 120 retailers).

Findings on the marketing channels showed that palm wine marketing had five marketing channels. The marketing channels identified were; tappers consumers (8%); tappers —> wholesalers —> consumers (60%); tappers —> retailers —consumers (30%); tappers —» retailers- local gin distillers consumers (1%) and tappers-wholesalers-retailers-consumers (1%).

Enterprise budgeting analysis result showed that OPW marketing generated gross margin, net marketing income, mean net marketing income and net return on investment of N4,975,076. 4.920 180.02, N82,003 and 0.65 respectively while RPW marketing recorded gross margin, net marketing income, mean net marketing income, and return on investment of N3,640,020. 3.620 N93.08, N60.348.21 and 0.89 respectively. By implication, both the OPW and RPW marketing were profitable but RPW was more profitable than OPW marketing.

On the determinants of profit/ net marketing income realized by OPW and RPW marketers, purchase and selling prices, transportation cost, and marketing cost statistically and significantly influenced both OPW and RPW marketers' profit while marketing cost, purchase and selling prices were common significant determinants of profit realized by the wholesalers of OPW and RPW, selling price was the only common determinant of profit realized by the retailers of OPW and RPW.

Constraints to palm wine marketing in the study area arranged in descending order of seriousness, were high cost of transportation,

lack of modern storage facilities, low shelf life, seasonally of supply, poor patronage and high cost of palm wine, adulteration and price instability.

4.1 Conclusion

Palm wine marketing in South East Nigeria proved to be a profitable and efficient enterprise given the positive values of gross margin, net marketing income, mean net marketing income, net return on investment and marketing efficiency levels for both OPW and RPW. The intermediaries were more efficient in the marketing of RPW than OPW. For marketing efficiency levels attained by the intermediaries to improve, likewise profit, policy measures must be directed toward the mitigation of the constraints identified by this study, especially high cost of transportation and lack of storage facilities.

4.2 Recommendations

Based on the findings of the study, the following recommendations were made:

Introduction of innovations such as hybrid plants, provision of financial assistance, provision and maintenance rural and urban road network, establishment of palm wine bottling industies and encouraging of more research on production, preservation and marketing of palm wine.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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