Socio Economic Importance and Marketing of *Pterocarpus osun* in Ibadan South West Local Government, Oyo State, Nigeria

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ABSTRACT

This paper reported the socio economic importance and marketing of *P. osun* in Ibadan South West Local Government, Oyo State, Nigeria. Data were collected through the use of structured Questionnaire administered to 150 respondents. Descriptive statistics, Cost and return, and the cost-benefit ratio were determined while Gini coefficient was used to analyze the market structure. The result showed that 73.8% of the respondents were female while 46-55years were 34.7%. *P. osun*'s leaves were used in the treatment of skin diseases while its roots and bark were used in the treatment of asthma, traditional soaps/antibacterial, its timber is also used in furniture making and building construction. The study further revealed that Bode market has the highest Net profit (₦96,319:98) while Beere market has the lowest Net profit (₦33,303:18) and the sawmills amassed an average Net profit of (₦5,389,625.00) per annum. The Gini coefficient (G=0.81) (G=0.71) for the *P. osun* herb sellers and *P. osun* timber sellers respectively indicates the market is highly monopolized and has minimal competition while the regression analysis revealed that age of the sellers and their religion are factors that influence the profit of *P. osun* sellers in the study area It can be concluded that *P. osun* trade is highly lucrative whereby an increase in capital will bring an increase in the quantity of *P. osun* and a sharp increase in profit made from this enterprise. There is the need to properly create awareness campaigns and educate the people about the economic values of *P. osun* which also require adequate management and conservation for sustainable utilization.

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Introduction

P. osun (Fabaceae) commonly known as padauk (English) and osun (Yoruba Western Nigeria) is endemic to southern Cameroon, Congo, Gabon, Equatorial-Guinea, Nigeria, and Zaire (Burkill, 1995). It has distinct pickles on twigs and young branches. The trees are about 30 m tall, with a girth size of about 2.4 m. The fruits are dark brown and velvety when young, with short shift and often pickles, mostly surrounding the center (Keay et al., 1964).

Burkill (1995) stated that the genus *Pterocarpus osun* also referred to as camwood are found generally in many tropical areas of the globe particularly Africa and Asia where they are used for the management of a wide range of ailments. The powdered stem prevents infections of the freshly severed umbilical cord. It has been used to treat rheumatism, eczema, gonorrhea, candidasis and acne (Gill, 1992) and the stem is an ingredient of traditional medicines against sickle-cell disorder and amenorrhea (Uphof, 2001). The dry leaf is also an ingredient of traditional black soap that is based on ash of burnt cocoa pods and palm oil while the heartwood, bark and roots are pounded into a paste and used as skin cosmetic.

This indigenous specie is highly endangered and under threat due to the continuous advancement of civilization and other human activities resulting from poverty. The public isn't well informed on the need for conservation, therefore resulting in the continuous irrational use of our indigenous species.

This study is significant as it would provide the much needed data and information on the socio-economic importance and marketing of *Pterocarpus osun* and its contributions toward environmental protection and health improvement of the people in the study area. This could encourage the wise use of *P. osun* in the urban areas.

Methodology

Study Area

The study was carried out in Bode, Oja oba, Beere, and sawmills in Ibadan South West Local Government, Oyo State, Nigeria. This city is the capital of Oyo state and the third largest metropolitan area by population in Nigeria, and it has the largest area as a city in Nigeria and third largest in the Africa (National Bureau of Statistics, 2006). Ibadan is located in South West, Nigeria, 128km inland north east of Lagos. Its coordinates are: 7°23"47'N, 3°55"0'E/7.39639 N 3.91667 E and its area total is 3,080km^2(1,190 sq mi) (Demographia, 2016).

Sampling Procedures and data collection

Data used for this study was obtained from the respondents through the use of structured questionnaire which were herb sellers and saw-millers. Multistage sampling technique was used to select 150 respondents with a three-stage design.

Stage 1: Purposive selections of Local government area in Ibadan in which markets and sawmills were selected.

Stage 2: Purposive selection of three (3) markets and Sawmills in the selected LGA

Stage 3: Selection of respondents from locations by random sampling

Data analysis

Descriptive statistical tools, chi square and Pearson Product-Moment Correlation (PPMC) were used to analyze the variables of interest. Cost and Return analysis and Gini coefficient were used to establish the degree of profitability and market structure.

Regression Analysis

The multiple regression analysis was used to determine socio economic factors influencing the profitability of *P.osun* in the study area.

$$Y = (b_0 + b_1X_1 + b_2X_2 + \ldots\ldots + b_8X_8) \quad (1)$$

Where X_1 = sex

X_2 = Age

X_3 = Ethnic group

X_4 = Marital status

X_5 = Level of education

X_6 = Years of experience

X_7 = Mode of entry

X_8 = Capital income

Y = Income

COST AND RETURN ANALYSIS

- Total Variable cost (TVC) i.e. cost expended on the processing and marketing of *Pterocarpus osun* .e.g. cost of raw materials, transportation and market tariffs.

Results

- Gross profit (GP) = TR – TVC (2)
- Where TR (Total Revenue) = unit price x quantity (3)
- Net profit (NP) = Total Revenue (TR) – Total Cost (TC) (4)

Where TC = TFC + TVC (5)

Rate of Return (ROR) : $\dfrac{TR}{TC} \times 100$ (6)

Rate of Return on Investment (R.O.R.I) = $\dfrac{TR - TC}{TC} \times 100$

(7)

- Profitability Index (P.I) = $\dfrac{G.P}{T.R}$ (8)
- Benefit Cost Ratio (BCR) = Total Revenue (Benefits) ÷ Total cost (9)
- BCR = $\dfrac{\sum_{K=1}^{n}(Ak/(1+i)k)}{A_o}$ (10)

3.4.4 Gini Coefficient

This was used to analyze the structure of the market, The market's structure can be examined using the Lorenz curve and Gini coefficient (Dillon and Hardaker, 1993).

Mathematically,

$$G = 1 - \sum XY \quad (11)$$

Where, G = Gini coefficient

X = Percentage of seller per period of study

Y = Cumulative percentage of total revenue

Table 1. Socio-economic Characteristics of Respondents.

Variables	Frequency	Percentage	Mode
sex			
Male	43	28.6	
Female	107	71.4	Female
Age (years)			
18-24	5	3.3	
25-35	27	18	
36-45	47	31.3	
46-55	52	34.7	46-55
>55	19	12.7	
Marital status			
Married	103	69.6	69.6
Single	18	12.2	
Divorced	27	18.2	
Ethnic Group			
Hausa	4	2.7	
Yoruba	144	97.3	yoruba
Igbo	-	-	
Level Of education			
No formula education	28	18.7	
Primary	66	44	44
Secondary	45	30	
Tertiary	11	7.7	
Source of Capital			
Personal Saving	129	86	Personal Saving
Bank Loan	14	9.3	
Inheritance	3	2	
Cooperative	2	1.3	
Personal loan	2	1.3	

Source: Field Survey, 2016

Table 2. Production of *Pterocarpus Osun*.

Variables	Frequency	Percentage	Mode
Do you Cultivate?			
Yes	2	1.3	
No	148	98.7	No
Source of raw material			
Farm	81	54.0	Farm
Free area	8	5.3	

Forest Reserve	61	40.3	
Viability of stored Pterocarpus osum			
1-3 Month	15	10	
4 month-1/2 yr	86	57.4	4month-1/2 yr
½-1 yrs	36	24	
>1 yr	13	8.7	

Source: Field survey, 2016

Table 3. Valuation and Utilization of *P. osun* Plant Parts.

Variables	Frequency	Percentage	Mode of preparation	Mode of use
Is the plant valuable?				
Yes	132	88		
No	18	12		
Leaves usage				
Skin diseases	108	72	The dry powdered leaves is made into paste with any type of oil	Rub over affected area twice daily.
Bark usage				
Traditional soap	74	61.6	Burn the bark and add its ash to soap base.	Use every day.
Concotions	98	81.7	Boil the dry bark with lime, neem bark and leaves of *Senecio biafrae* (worowo)	Drink a cup three times daily after meal.
Anti-bacteria	101	84.2	The dry powdered stem is soaked in palm oil.	Rub all over skin.
Roots				
Asthma	30	20	Add a root to boiling water and mix with lemon.	Drink at least two cups daily
Stem extracts				
Gums and dyes	53	35.3		
Timber				
Door frame	17	56.7		
Roofing	21	70		
Furniture	19	63.3		

Source: Field survey, 2016

Table 4.Annual Average Profitability at Bode, Beere, Oja-Oba Market.

Item	Value (₦)		
	Bode	Beere	Oja-Oba
Variable Cost			
P. Osun	37,513.04	37,309.09	39,476.92
Transportation	12,756.00	14,016.00	10,980.00
Shop	17,460.00	16,176.00	17,760.00
Tax	2,500.00	673.08	150.00
Miscellaneous	1,000.00	1,561.11	350.00
Total Variable Cost	71,229.04	69,735.28	68,716.92
Total Revenue	167,549.02	103,038.46	158,475.00
Net Profit	96319.98	33,303.18	89,758.08
Rate of Return (ROR)	235.23%	147.76%	230.62%
Rate of Return on Investment (RORI)	135.23%	47.76%	130.62%
Benefit cost ratio(BCR)	2.35	1.48	2.31
Profitability index(PI)	0.58	0.32	0.57

Source: Field Survey, 2016

Table 5:.Annual Average Profitability of *P. osun* Timber Sellers in the Study Area.

Item	Value (₦)
Variable Cost	
Log	722,333.33
Transportation	159,833.33
Tax	43,541.67
Miscellaneous	201,666.67
Total Variable Cost	1,127,375.00
Total Revenue	6,517,000.00
Net Profit	5,389,625.00
Rate of Return (ROR)	578.07%
Rate of Return on Investment (RORI)	478.07%
Benefit cost ratio(BCR)	5.79
Profitability index(PI)	0.83

Source: Field survey, 2016

Table 6. Annual Average Costs and Returns Analysis of *P. osun* herb Sellers in the Study Area.

Item	Value (₦)
Variable Cost	
P. Osun	38,186.92
Transportation	12,412.17
Shop	17,285.22
Tax	1,280.17
Miscellaneous	906.47
Total Variable Cost	70,070.95
Total Revenue	150,111.11
Net Profit	80,040.17
Rate of Return (ROR)	214.23%
Rate of Return on Investment (RORI)	114.23%
Benefit cost ratio(BCR)	2.14
Profitability index(PI)	1.14

Source: Field survey, 2016

Table 7. Distribution of *Pterocarpus osun* sellers by revenue in Bode Market.

Total Revenue	No. of sellers	% of sellers (X)	Cum. Freq.	Cum. % of sellers	Total Revenue	% of Total Rev. (Y)	Cum. % of Total Rev.	(X/100) (Y/100)
₦100,001 - ₦120,000	4	7.8	4	7.8	460,000	5.4	5.4	0.00422
₦120,001 - ₦140,000	3	5.9	7	13.7	415,000	4.9	10.2	0.00286
₦140,001 - ₦160,000	13	25.5	20	39.2	2,020,000	23.6	33.9	0.06026
₦160,001 - ₦180,000	16	31.4	36	70.6	2,765,000	32.4	66.2	0.10152
₦180,001 - ₦200,000	15	29.4	51	100.0	2,885,000	33.8	100.0	0.09930
Gini Coefficient=	0.73							

Source: Field survey, 2016

Table 8. Distribution of *Pterocarpus osun* sellers by revenue in Beere Market.

Total Revenue	No. of sellers	%f sellers (X)	Cum. Freq.	Cum.% of sellers	Total Revenue	%of Total Rev.(Y)	Cum. % of Total Rev.	(X/100) (Y/100)
₦70,000 - ₦100,000	17	65.4	17	65.4	1,489,000	55.6	55.6	0.36341
₦100,001 - ₦120,000	4	15.4	21	80.8	460,000	17.2	72.8	0.02642
₦120,001 - ₦140,000	2	7.7	23	88.5	270,000	10.1	82.8	0.00775
₦140,001 - ₦160,000	3	11.5	26	100.0	460,000	17.2	100.0	0.01981
Gini Coefficient	=0.58							

Source: Field survey, 2016

Table 9. Distribution of *Pterocarpus osun* sellers by revenue in Oja-Oba Market.

Total Revenue	No. of Practitioners	% of Practitioners (X)	Cum. Freq.	Cum. % of Practitioners	Total Revenue	% of Total Revenue (Y)	Cum. % of Total Revenue	(X/100) (Y/100)
₦70,000 - ₦100,000	2	5.0	2	5.0	200,000	3.2	3.2	0.00158
₦100,001 - ₦120,000	5	12.5	7	17.5	580,000	9.1	12.3	0.01144
₦120,001 - ₦140,000	4	10.0	11	27.5	550,000	8.7	21.0	0.00868
₦140,001 - ₦160,000	12	30.0	23	57.5	1,850,000	29.2	50.2	0.08755
₦160,001 - ₦180,000	8	20.0	31	77.5	1,410,000	22.2	72.4	0.04449
₦180,001 - ₦200,000	9	22.5	40	100.0	1,749,000	27.6	100.0	0.06208
Gini Coefficient=	0.78							

Source: Field survey, 2016

Table 10. Distribution of *Pterocarpus osun* Timber Sellers by Revenue in all markets.

Total Revenue	No. of sellers	% of sellers (X)	Cum. Freq.	Cum. % of sellers	Total Revenue	% of Total Rev. (Y)	Cum. % of Total Revenue	(X/100)(Y/100)
₦2,000,000 - ₦4,000,000	1	3.3	1	3.3	2,940,000	1.50	1.50	0.00050
₦4,000,001 - ₦6,000,000	13	43.3	14	46.7	64,030,000	32.75	34.25	0.14181
₦6,000,001 - ₦8,000,000	10	33.3	24	80	69,920,000	35.76	70.02	0.11909
₦8,000,001 - ₦10,000,000	3	10	27	90	25,620,000	13.10	83.12	0.01310
₦10,000,001 - ₦12,000,000	3	10	30	100	33,000,000	16.88	100.00	0.01688
Gini Coefficient = 0.71								

Source: Field survey, 2016

Table 11. Distribution of *Pterocarpus osun* sellers by revenue.

Total Revenue	No. of sellers	%of sellers (X)	Cum. Freq.	Cum. % of sellers	Total Revenue	%of Total Rev. (Y)	Cum. % of Total Revenue	(X/100)(Y/100)
₦70,000 - ₦100,000	19	16.2	19	16.2	1,689,000	9.62	9.62	0.01558
₦100,001 - ₦120,000	13	11.1	32	27.4	1,500,000	8.54	18.16	0.00948
₦120,001 - ₦140,000	9	7.7	41	35	1,235,000	7.03	25.19	0.00541
₦140,001 - ₦160,000	28	23.9	69	59	4,330,000	24.65	49.84	0.05892
₦160,001 - ₦180,000	24	20.5	93	79.5	4175000	23.77	73.61	0.04873
₦180,001 - ₦200,000	24	20.5	117	100	4,634,000	26.39	100.00	0.05409
Gini coefficient= 0.81								

Source: Field survey, 2016

Table12. Regression analysis to investigate factors influencing the profit of *P. osun* sellers in the study area.

Variables	Linear Model		Semi-Log Model		Double-Log Model	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
(Constant)	213138.203	2.451**	213138.203	2.451**	13.577	8.879***
Location	-1845.825	-1.142[ns]	-1845.825	-1.142[ns]	-.025	-.878[ns]
Gender	-2031.410	-.165[ns]	-2031.410	-.165[ns]	-.043	-.197[ns]
Age	-12702.876	-2.321**	-12702.876	-2.321**	-.214	-2.224**
Marital Status	4256.462	.864[ns]	4256.462	.864[ns]	.093	1.070[ns]
Level of Education	-5282.325	-.848[ns]	-5282.325	-.848[ns]	-.091	-.832[ns]
Ethnic Group	-16855.041	-.686[ns]	-16855.041	-.686[ns]	-.383	-.887[ns]
Religion	-18289.761	-2.298**	-18289.761	-2.298**	-.385	2.752***
Mode of Occupation Acq	-2355.044	-.290[ns]	-2355.044	-.290[ns]	.017	.118[ns]
Years in the Area	-238.422	-.040[ns]	-238.422	-.040[ns]	.030	.291[ns]
R^2		18.0%		18.0%		19.2%
F-value		1.820*		1.820*		1.969**

Source: Field survey, 2016
ns = Not significant at 10% (p<0.10) level
* = Significant at 10% (p<0.10) level
** = Significant at 5% (p<0.05) level
*** = Significant at 1% (p<0.01) level

Table 13. Regression analysis to investigate factors influencing the profit of *P. osun* timber sellers in the study area.

Variables	Linear Model		Semi-Log Model		Double-Log Model	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
(Constant)	-7712542.614	-.790[ns]	-7712542.614	-.790[ns]	12.768	7.627
Gender	-3145590.631	-1.895*	-3145590.631	-1.895*	-.628	-2.204**
Age	-99874.215	-.140[ns]	-99874.215	-.140[ns]	-.011	-.087[ns]
Marital Status	699538.998	1.114[ns]	699538.998	1.114[ns]	.158	1.464[ns]
Level of Education	505223.023	.699[ns]	505223.023	.699[ns]	.058	.465[ns]
Ethnic Group	2581046.297	.997[ns]	2581046.297	.997[ns]	.581	1.309[ns]
Religion	-655133.578	-.617[ns]	-655133.578	-.617[ns]	-.237	-1.300[ns]
Mode of Occupation Acq	1784875.534	1.556[ns]	1784875.534	1.556[ns]	.389	1.976*
Years in the Area	1325151.949	1.765*	1325151.949	1.765*	.313	2.430**
R^2		29.1%		29.1%		38.7%
F-value		0.774[ns]		0.774[ns]		1.195[ns]

Source: Field survey, 2016
ns = Not significant at 10% (p<0.10) level
* = Significant at 10% (p<0.10) level
** = Significant at 5% (p<0.05) level
*** = Significant at 1% (p<0.01) level

Discussion

Pterocarpus osun contributes significantly to the socio economic livelihood of the people. The study showed that females (73.8%) dominated the *P. osun* enterprise while 26.2% are male. Majority (83%) of the herb sellers were female with just 17% of male while majority (80%) of the sawmillers were male with just 20% of female. Sumar and Veena (2004) reported that women all over the world form a majority of labour force of Forest based small scale enterprises as it helps women to earn supplementary income for the family. Majority (69.6%) of the respondents are married and this conformed with the findings of Taphone (2009) who reported that married people have more responsibilities in taking care of their family members and this may be the reason why the enterprise is dominated by them so as to meet these responsibilities.

Majority of respondents were involved in the sales of *P.osun* on a full time basis, an indication that herbal trade can provide full time employment to the populace and this was found out by Balogun, (2011). The 46 – 55 age class has the highest population of respondents, this points to the fact that majority of respondents are in their active and prime age in terms of marketing efficiency thus conforming with Kassali et al.,(2015) who reported that individuals in their early fifties and below fall in the active age in terms of marketing efficiency and business risk taking. The large number of

people in household of respondents could be as a result of polygamy, it might lead to more mouths to feed, thereby infringing on the ability to save money and the family might also be used as free labour as recorded by Alfred and Akintunde, (2002).

A majority (52.1%) of the respondents inherited the profession, this means that they do not require formal skill and the knowledge is usually passed down the lineage. Ethnic diversity of marketers revealed that (97.3%) of them are yorubas' with traces of Hausas' (2.7%) and no sign of igbos', The Yorubas' are most knowledgeable about the plant and this is probably due to the fact that it was passed down to them from their ancestors and some were unwilling to part with information related to the use and preparation of *Pterocarpus osun* which is limiting the knowledge of the plant available to the general public.

Most (98.6%) of the respondents do not cultivate *P. osun* while (1.4%) claimed to cultivate. This might be one of the reasons for the endangered status of *P. osun* as the timber is being exploited excessively without replanting. The powder of the dried leaves and bark is made into paste with any oil and is applied for superficial skin diseases such as eczema, candidasis and acne and this supports the view of Uphof, (2001). It's also used to rub the skin of newly born babies when soaked in oil to prevent them from bacterial infection (Sofowora, 2008).

The root also used in the treatment of asthma in accordance with the findings of Gill (1992). *P.osun* timber is used for roof construction, furniture making and door frames, this conformed with the findings of Lemmens, (2008) who stated that its used for heavy duty purposes such has heavy construction, furniture and carpentry.

P. osun enterprise in the study area could be termed profitable with Benefit Cost Ratio (BCR) of 2.35, 1.48, 2.31 and 5.79 for Bode, Beere, Oja oba market and Sawmills respectively. Investment criteria requires that the BCR should be greater than one [BCR >1] before a venture can be termed profitable (Adegeye and Dittoh, 1985), this means that an increasing return to scale with every ₦100 invested, the enterprise gives a return of additional ₦135, ₦48, ₦131 and ₦479 respectively over and above the amount invested. The higher the rate of return on investment, the better for the success of the business (Olukosi and Erhabor, 2005). The Rate of Return on Investment (RORI) of 135.23%, 47.76%, 130.62% and 478.07% for Bode, Beere, Oja oba market and Sawmills respectively also showed that the business is lucrative in the study area .

The value of Gini coefficient greater than 0.35 is said to be high, indicating inequitable distribution of income/sales (Dillon and Hardaker,1993) hence the Gini coefficient (G) of 0.73, 0.58, 0.78 and 0.71 for Bode, Beere , Oja oba market and Sawmills respectively reveal that the markets for P. osun are highly monopolized, concentrated and with minimal competition in the markets in Bode and Oja-Oba markets while it is less monopolized in Beere market. Also the market structure of *P. osun* for timbers is highly monopolized and with minimal competition in the markets.

It was revealed that age of the sellers and their religion were factors that influence the profit of *P. osun* sellers in the study area and that the older a seller is the lesser the profit realized from the sales of *P. osun* and this is due to reduction in marketing efficiency with increase in age, Kassali et al.,(2015) stated that individuals in their early fifties and below fall in the active age in terms of marketing efficiency, while the gender of timber sellers, mode of occupation acquisition and the number of years a timber seller has lived in the area were factors that influenced the profit of *P. osun* timber sellers in the study area and this indicated that the longer a seller has been living in the area the more profit realized from the sales of *P. osun* timber in the study area.

Conclusion

P. osun enterprise is worthwhile and highly lucrative. It is observed that a majority do not feel the need to cultivate *P. osun* as they believe it takes a lot of time and care to be managed and this has drastically affected its abundance in the natural forest as they are being harvested with no due replacement while the few that claimed to have tried cultivating it said it wasn't successful. Hence the need for government and private agencies intervention to promote conservation of this particular specie as it is greatly endangered which will also affect the survival of people in the *P. osun* enterprise.

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