



## Evaluation of Cost and Return Analysis and Determinants of Profitability of Sawmill Industry in Ogbomoso Area of Oyo State, Nigeria

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**ABSTRACT:** The study examined cost and return analysis and determinants of profitability of saw mill industry in Ogbomoso area of Oyo state, Nigeria. Multi-stage sampling procedure was employed to select seventy-six (76) saw millers in the study area. Detailed questionnaire was used to obtain relevant information from the respondents. Budgetary analysis was used to calculate the profitability while regression analysis was used to determine factors affecting the profitability of the sawmill. About thirty-six percent (36%) of the respondents fell within the age range of 51 -60 years, eighty three percent (83%) were males and ninety two percent 92% engaged in saw milling as the only source of livelihood. The result of the budgetary analysis showed that total variable cost was (TVC) ₦1,044,142, Total fixed cost (TFC) was ₦65,774.5 while the total cost (TC) was computed as ₦1,109,917.4 and total revenue (TR) was ₦1,721,573. The profit realized was ₦611,655.6 and the gross margin was ₦ 677430.1 while the BCR was 1.55. The result of the regression analysis showed that number of trained sawyers (P<0.1), source of capital (P<0.1) and quantity of plank sold (P<0.05) and type of conversion machine used (P<0.05) increased the profitability of sawmill business in the study area. The study recommended that old/obsolete machineries should be replaced and respondents' proper training is paramount to an efficient saw milling operation.

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Forest is a major economic resource of great importance to the people and the Nation in general. The main products derived from the forest are trees (timber). Timber is the most economically important product of the forest. Globally, about 3.4 billion cubic meters of timber equivalent are provided from the forest yearly (Babatunde, 2019). Economic activities associated with forest resources has contributed to national economies and provided employment opportunities (Uzu *et al.*, 2022). People used timber in the construction of houses, barns, fences, bridges,

furniture items and musical instruments. In contemporary times, wood is still widely used for constructional purposes. Pulp, paperboard, rayon, cellophane, photographic films, tannin, methanol, ethanol, wood adhesives and chemical derivatives are made from timber hence it is a valuable raw materials to industries (Babatunde, 2019). Sawmill is a critical industry whose performance has direct implications for both present and future generations. Timber industry has the potential to improve economic performance and increase state and household

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revenues. Sawmills account for 93.32% of the total number of wood based industries in Nigeria in 1997 (Fuwape, 2001). Amongst some popular micro-enterprises in the country such as block-making, carpentry, soap making and tailoring, sawmill industry is at the fore front of the economy advancement and growth (Ajibefun and Daramola, 2004) as cited by (Ogundari, 2010). Timber marketing activities serves as a source of livelihood sustainability through cash income and employment opportunities in many rural and urban areas (Sambe *et al.*, 2022). This invariably contributes to the nation's economic growth and development. A lot of people partake in the production of and marketing of timber because of its ability to generate quick return or profit with little risk in contrary to the secondary processing activities for export (Sambe *et al.* 2016). As evident, demand for plank is rising in almost every part of Nigeria without a balanced supply. Availability of sawn wood has been discovered to be problem that can be attributed to the sawn wood production from the point of felling to the last stage of selling of wood. Sawmill industry is characterized by small scale operation which constitutes more than 90% of the entrepreneurs in the sector. A research conducted by Akanni and Adetayo 2011 stressed out some problems affecting the improvement of the sawmill industries as low capital utilization, inadequate logging equipment, shortage of spare parts and skilled manpower coupled with poor condition of the machinery and tools. Apart from energy supply, another major factor limiting growth in sawmill industry is scarcity of economic timber resources (Larinde, 2010). These problems are also, peculiar to the sawmill industries in Ogbomoso area of Oyo state. Several studies have been carried out on

cost and return analysis and technical efficiency of timber (Ogundari, 2011, Akanni and Adetayo, 2011, Babatunde, *et al.*, 2019), as a result an outstanding study would be of high necessity to estimate the cost and return of saw mill industry in the study area. Therefore, the objective of this study is to evaluate the cost and return analysis and determinants of profitability of sawmill industry in Ogbomoso Area of Oyo state, Nigeria.

## METHODS AND MATERIALS

*The study area:* The study was carried out in Ogbomoso, Oyo state. Ogbomoso has five local government areas namely, Ogbomoso north, Ogbomoso south, Oriire, Suurulere and Ogo – Oluwa. It lies on the latitude  $8^{\circ} 10' N$   $40^{\circ} 10' E$  of the Greenwich meridian. Ogbomoso is in Southern Guinea savanna zone. The climate is equatorial notably with dry and wet season with relative humidity. Average daily temperature ranges between  $25^{\circ} C$  ( $77.0^{\circ} F$ ) and  $35^{\circ} C$  ( $95.0^{\circ} F$ ) almost throughout the year. The population was approximately 354,690 in 2006 census. Majority of the people are members of the Yoruba ethnic group. Agriculture is a major occupation of the people in the area as yams, cassava, cashew, mango, maize, and tobacco are some of the notable agricultural products of the region. Also, cashew and mango plantations are widely distributed across the land. Ogbomoso is one time the largest planter of cassava across the globe. The residents also engage in trading and rearing of domestic animals like goats and sheep. Also, saw milling business is a viable enterprise in the area.

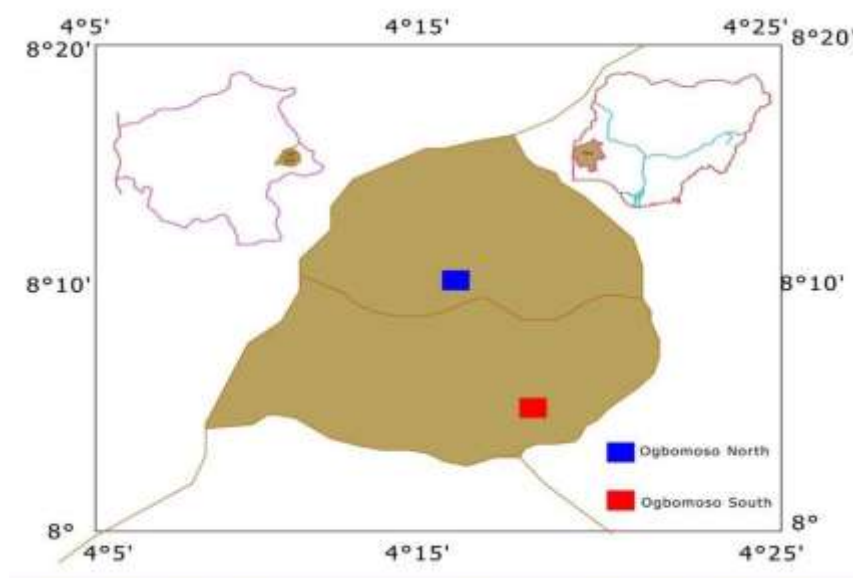


Figure 1: Map of Ogbomosoland. Source: Oyo state website

**Sampling Procedure and Sampling Size:** Primary data was used for this study and data was collected with the aid of well - structured questionnaires/interview guide. Information such as age, sex, household size, years of saw milling experience, source of capital, quantity of saw wood produced, prices per plank etc were enquired. Multi-stage sampling technique was used to select the respondents for this study. The first stage involves a purposive selection of two Local Government Areas: Ogbomoso North and Ogbomoso South. This selection was borne out of the fact that the two local government areas selected are the largest and most populated areas out of the five local government areas that make up Ogbomoso land. The second stage involves purposive selection of four prominent saw mills in the study area. These are Aaje- Ikose, Pakiotan, Ile- ewe and Ahoyaya saw mills. The third stage was the random selection of thirty(30) saw mill operators from Aaje – ikose being the largest saw mill in the area, followed by eighteen (18) respondents from Pakiotan, Seventeen (17) respondents from Ile – ewe saw mills and fifteen (15) Ahoyaya saw mills to make a sample size of eighty (80) saw millers. This selection method is proportionate to sample size of the respondents in the study area. Out of the eighty (80) respondents sampled for the study, only seventy-six (76) were retrieved and used for analysis.

**Data collection: Method of data analysis:** Descriptive statistics and budgetary analysis were adopted for the study. Descriptive statistics was used to analyze the socio-economic characteristics of the respondents and constraints faced by timber marketers while budgetary analysis as used by Babatunde *et al.*, 2017 and Olapade - Ogunwole *et al.*, 2011 was used to analyze the profitability of timber marketing in the study area as in equation 1.

$$\pi = TR - TC \quad (1)$$

Where;  $\pi$  = Profit; TR = Total Revenue and TC = total Cost

$$TC = TVC + TFC \quad (2)$$

The Gross margin is given by equation 3:

$$(GM) = TR - TVC \quad (3)$$

$$TR = P.Q \quad (4)$$

Where; P= Price per plank, Q= quantity of planks sold; TVC = total variable cost incurred in plank processing such as transportation cost, cost of log, cost of power used, labour, rent etc. TFC= total fixed cost incurred such as depreciated cost of machinery, cost of generating set and cost of lorry. Benefit - Cost Ratio

(BCR) is a measure of profitability. It was used to determine and to confirm the profitability of each sawmill operator. The formula is stated as;

$$BCR = \text{Total Revenue (Benefit)} \div \text{Total cost}$$

A business enterprise can be termed profitable if BCR is greater than one [BCR > 1] (Adegeye and Dittoh, 1985).

**Rate of Return on investment (RORI):** This is another measure of profitability used to evaluate how worthwhile an investment is. According to Sambe *et al.*, 2016 rate of Return on investment using equation 5.

$$TR - \frac{TC}{TC} \times \frac{100}{1} \quad (5)$$

Hence, the higher the rate of return, the more profitable the business is.

**Regression analysis:** Regression analysis measures the degree of association of relationship between a dependent variable(Y) and some set of independent variables (X). The model for the regression analysis is given as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \quad (6)$$

Where Y= estimated revenue,  $X_1$ =age,  $X_2$ = years of experience,  $X_3$  = source of capital,  $X_4$ = type of conversion machine used,  $X_5$ = quantity of planks sold,  $X_6$ = number of trained sawyers and  $X_7$  = Power

## RESULTS AND DISCUSSION

**Socio-economic characteristics of saw millers in the study area:** Table 1 presents the socio- economic characteristics of the respondents in the study area. Age of the respondents showed that a good percentage (36%) of the respondents were found to be within the age range of 51 and 60 years of age, only very few (7%) fell within the age range of 31 and 40 years. This implies that most of respondents were aged people and this aligns the findings of Agbonlahor (2010) who reported that most of his respondents were between the age of 51 and 60 years and this directly affects their productivity and ability to take risk. In terms of sex of the respondents, the result showed that majority (83%) of the respondents were males while few (17%) of them were females. This is an implication that the drudgery nature of the work makes it suitable for men to engage in the business as compared to women. Further, about 92% of the respondents engaged in saw milling operation as the only source of income while the remaining 8% were traders. This implies that saw

milling business is a very profitable and reliable source of livelihood in the study area. As regards respondents' level of education, majority (90%) of the respondents were literate while only 9% had no formal education. This is an indication that there is a good literacy level in the study area. This result aligns with the study of Akanni and Adetayo, 2011 where 75% of the respondents had formal education.

**Table 1:** Socio-economic characteristics of the respondents

Socio-economic variables	Frequency	Percent
<b>Age</b>		
31 – 40	7	9.2
41 -50	18	23.7
51 -60	37	48.7
61 -70	14	18.4
<b>Sex</b>		
Male	63	82.9
Female	13	17.1
<b>Marital Status</b>		
Single	4	5.3
Married	56	73.7
Divorce	2	2.6
Widow/widower	14	18.4
<b>Level of education</b>		
No formal educ	7	9.2
Primary	12	15.8
Secondary	35	46.1
Tertiary	22	28.9
<b>Years of experience</b>		
1 – 4	10	13.1
5 -9	17	22.4
>10	49	64.5
<b>Type of conversion machine</b>		
Circular saw	27	35.5
Band saw	13	17.1
Both	36	47.4
<b>Sources of logs</b>		
Govt forest reserve	12	15.8
Farms	41	53.9
Natural forest	23	30.3
<b>Number of Lorries</b>		
1	46	60.5
2	16	21.1
0	14	18.4
<b>Membership</b>		
Yes	71	93.4
No	05	6.6
<b>Benefit Derived</b>		
Price fixation	11	14.5
Loan facilities	19	25.0
Social interaction	28	36.8
Marketing education	18	23.7

Regarding working experience, most of the respondents (64%) had more than ten years of working experience and this therefore indicates that they have been in the business for long. This result is in consonance with the findings of Agbonlahor (2010) where he affirmed that most of his respondents had more than ten (10) years of working experience and that saw-milling experience is very important for an improved productivity. Finally, majority of the respondents (93.4%) belong to saw millers association

while very few (6.6%) did not join the association due to individual opinion and some other factors. About 37% and 24% of the respondents joined the association for social and marketing education respectively.

*Budgetary analysis of sawmill industry in the study area:* The table presents the costs and return of sawmill industry in the study area. The profitability of sawmill enterprise was assessed using budgetary method. The total cost of all the respondents were calculated and total revenue was estimated to determine the profitability of sawmill industry. From the result of the analysis, the average monthly total cost of 76 respondents of the sawmill operators/marketers was computed using straight line depreciation method to calculate the total fixed cost. The total variable (TVC) cost was amounted to ₦1,044,142.9, total fixed cost (TFC) was ₦65,774.5, total cost (TC) amounted to ₦1,109,917.4 while total revenue (TR) was ₦1,721,573. The gross margin realized per month was ₦677,430.1 while the monthly net profit made from the business was ₦611,655.6

**Table 2:** Budgetary analysis

Average Variable costs per month	(₦)
Cost of log	196,311
Cost of transportation	299,276
Cost of wages	135,197
Cost of rent	14,747.1
Cost of diesel	305,000
Cost of electricity	23,973.7
Maintenance cost	52,460.5
Tax =	17,177.6
<b>Total variable cost (TVC) =</b>	<b>1,044,142.9</b>
<b>Fixed Cost</b>	
Depreciated cost of machine =	11,506.1
Depreciated cost of generating set=	26,112.1
Dep. cost of lorry =	28,156.3
<b>Total Fixed Cost (TFC) =</b>	<b>65,774.5</b>
<b>Total Cost (TC) =TVC +TFC =</b>	<b>1,109,917.4</b>
1,044,142.9 + 65,774.5 =	
<b>Revenue = P.Q =</b>	<b>1,721,573</b>
<b>Profit ( π) = TR- TC =</b>	<b>611,655.6</b>
1,109,917.4 =	
<b>Gross Margin = TR – TVC =</b>	<b>677,430.1</b>
– 1,044,142.9 =	

*Investment Analysis:* In order to further test for the profitability of the business, the rate of return on investment (RORI) and benefit-cost (BCR) analysis were calculated. The benefit/cost ratio showed that for every ₦1 invested in sawmill business, a profit of 55kobo was made and this showed that the business is worthwhile and profitable. Also, the rate of return on investment value was computed as 55.12% indicating that the business is profitable.

$$BCR = ATR/ATC = 1,721,573 / 1,109,917.4 = 1.55$$

Where BRC = Benefit-cost ratio

$$\begin{aligned}
 RORI &= \frac{ATR}{ATC} - \frac{ATC}{1} \times 100 \\
 &= \frac{1721573}{1109917.4} - \frac{1,109917.4}{1} \times 100 \\
 &= 5.12\%
 \end{aligned}$$

*Regression Analysis:* Table 3 showed the result of regression analysis on determinants of profitability of sawmill industry in the study area. Four out of the seven dependent variables included in the model were found to have a direct relationship on profitability of sawmill in the study area. The coefficient of source of capital used in the business was positive and significant at 10% level, indicating that sawmill business requires a lot of capital for the smooth running of the business enterprise. This conforms to the study of Akanni and Adetayo (2011) which discovered that sawmill business requires a huge capital outlay. Also, the coefficient of type of conversion machine used was positive and significant at 5% level, implying that highly efficient conversion machine is a requisite for a successful sawmill operation. Another factor having direct influence on profitability of sawmill was quantity sold. This result depicts that some economic trees such as Iroko, Obeche and others traded in the study area have higher demand and market prices than others and as a result they increase the amount of profit made in sawmill business. The coefficient of number of trained sawyers was positive and significant at 5% level, showing the drudgery nature of the job and implying that more profit would be made as appropriate number of labour forces / trained sawyers are engaged into the business. This conforms to the study conducted by Kehinde *et al.*, 2010 where labour was reported as a determinant factor in sawmill operation.

**Table 3:** determinants of profitability of saw mill industry in the study area

Variables	Coefficient	Standard error	t-values
Constant	-4878413.4	5375143.7	-0.908
Age	64453.7	59864.3	1.077
Years of experience	651077.5	636695.3	1.023
Source of capital	632911.3	334374.7	1.893*
Type of machine	997279	479529.8	2.08**
Quantity sold	137.1	76.3	1.797*
No of sawyers	1218562.9	588746.0	2.070**
Power	116119.7	386638.4	0.30

*Dependent variable: revenue*

*n = 76; Adjusted R<sup>2</sup> = 0.72; \* - Statistically significant at 10% probability level; \*\* - Statistically significant at 5% probability level; \*\*\* - Statistically significant at 1 % probability level.*

*Challenges Facing Sawmill Business in the Study Area:* Tale 4 showed that a good percentage (44.7%) of the respondents in the study area indicated high capital outlay as challenges being faced in the business, another 18,4% of the respondents indicated

power shortage as their own challenges, 15.8% accounted for those whose challenges was shortage/ scarcity of economic trees in the forest while 13.2% were those who stated that high transportation cost affected their business and very few (7.9%) of the respondents were affected by government policies guiding log cutting in the forest.

**Table 4:** Challenges Facing Sawmill business in the study area

Challenges	Frequency	Percent
Power Shortage	14	18.4
Capital Intensive	34	44.7
Government policy	6	7.9
High transportation cost	10	13.2
Shortage/ scarcity of logs	12	15.8
<b>Total</b>	<b>76</b>	<b>100</b>

*Conclusion:* Findings from this study showed that sawmill enterprise is a profitable and viable business in the study area. However, challenges such as source of capital , transportation and power need to be worked upon or sorted out in other to have a smooth running of the sawmill enterprise. It is recommended that the respondents should form cooperative society and group contribution in other to ease the burden of capital needed in the sawmill enterprise since it is mostly needed to carry out almost all activities in the sawmill enterprise. Also, sawmill owners are enjoined to get highly efficient conversion machine as it is very paramount to a successful sawmill enterprise. Sawmill business owners are encourage to make deliberate efforts in regeneration of forest trees so as to promote forest conservation.

*Declaration of Conflict of Interest:* The authors declare no conflict of interest

*Data Availability Statement:* Data are available upon request from the first author or corresponding author.

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