

GUIDE INTO THE FEASIBILITY OF VERTICAL INTEGRATION OF SAWMILLS IN NIGERIAN

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Abstract: Lack of data on economies of scale in conversion is a hindrance to degree of integration of sawn wood production into furniture parts and components in Nigerian sawmill industry. Opportunities for development value-added wood products in Nigerian sawmill industry which is the only thriving wood based enterprise apart from furniture industry as at today were examined. The study analyse the operating requirements of the business, investment and financial requirement, prepared a detailed financial analysis using financial forecast of operations with some baseline information and assumptions in production plan to prepare a guide for expanded business operation and new investment in the sawmill industry. The result from the study showed that the opportunity of vertical integration is very attractive with pleasing return and not much risk. The Rate of Return on investment (RORI) of the integration project is 29.62%, over a 5 years pay back periods. Net Present Value (NPV) is ₦ 32,533,400.60 with 26% interest rate and Benefit-Cost Ratio of 1.25. It is also capable of providing low-income workers with 26 additional jobs in the mill. The study make an attempt to allay the fears of industrialist willing to expand their sawmill business operations and new entrants. The economic feasibility of integration in the general growth factor and government policies should also be considered since possible gains from integration are influenced by external factors due to the dynamic nature of the price and cost structure as well as forces of demand and supply.

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Introduction

Sawn wood production from round wood has continued to increase in Nigerian rainforest belt due to the preponderance of sawmill but the production output concentrate on local consumption by the construction and furniture industry with limited further processing (References). There are few large integrated industries who concentrate much on satisfying foreign partners because government regulations and capacity utilization do not create enough incentive for export market (Popoola and Adebuseye (1999); Larinde and Popoola (2008); and Akande, et. al, 2010). Nigeria's oil boom which gave impetus to industrial and residential construction, brought about a consistently good economic growth and increases in local disposable income, this translated to a growing demand for wood and wood products at expense of wood export culminating in the ban of round wood export in 1976 by the federal government (Ogunwusi, 2014; Popoola, 2012).

The boom also affected growth of other renewable natural in the agricultural sector which in the long run made the country a net importer of virtually everything that can be produce locally, furniture inclusive (Arowosoge, et. al, 2011). Popoola

(2012) observed that the value of forest product imports increased from N12.4 million to N31.8 million from 1962 to 1971. Several studies which evaluated the performance of the sawmill industry in Nigeria (GWV, (1994); RMRDC (1991); RMRDC (2003); RMRDC (2009); Ogunwusi (2012); Ogunwusi et al, (2013); Larinde (2010) and Ogunsanwo, 2010) observed a wide gap between installed capacity and operating capacity. Findings from their work indicated that the sawmill contributed significantly to local and international trade in the 1960's to 1980's and in 1998 to 2002 during the massive exploitation of Teak and Gmelina wood to Indian and Chinese market. During these periods the industry witnessed serious sub-optimal deployment of raw materials as semi-finished product which command low price were the output from the sector to the national economy. Popoola (2014) noted that several quantities of teak squared in small road-side sawmills and manually loaded into containers without records were shipped to India from Nigeria. The sawmill industry forms the production base for construction and furniture wood, but in recent time, there has been a great concern as to whether the operational status of these mills is consistent with

contemporary drive towards value added wood products and sustainable forest management.

Globally there is a change patterns of wood usage from sawn wood to processed and for Nigeria is to remain relevant in tropical wood supply trade it is necessary to embrace further processing of the sawn wood which can open opportunities up to bring revenue and employment opportunities to the ever increasing unemployed population, both urban and rural (Larinde, (2007); Popoola and Adebuseye, 2002). The current state of the Nigerian economy which is sliding into recession as a result of drop in oil revenue calls for the production a vibrant, high-value timber processing for strong presence in export market. The manufacture of further processed wood product is an instrument for economic development, capable of mobilizing latent resources and promoting the expansion of forest industries because of its foreign exchange earnings and savings potential (Jukka, 2001). The participation of forestry sector in generation of foreign exchange has it is been encouraged presently by government in agricultural sector for exports can easily be achieved through investment of capital for sawmill industry development by linking sawn wood export rights to local investment in further processing.

Adeyoju (1975) reported that Nigeria ranked second amongst the seven largest tropical wood producing countries in Africa in 1966, in terms of total quantity of logs produced and exported and the proportion of processed wood to log production. However, the advent of trade in petroleum led to a decline in timber exports over the following years. It is on record that the forestry sector generated about 2.5% of Nigeria's Gross Domestic Product (GDP), with wood and wood product exports accounting for about 1% of total foreign exchange earnings (CBN, 2003).

This study is therefore useful and significant in enhancing the economic viability and diversification of the sawmill industry for industrialization aimed at increasing profitability through further investments in the industries by deriving a cost-budget that can be projected as a guide to the feasibility of vertical integration of Nigerian sawmills.

Methodology

Study Area

This work is derived from an industry survey carried out on Nigerian forest industry with special reference to the vertical integration of sawmills to

evaluate the market potentials. 16 secondary wood processing firms were X-rayed, two in each of the states in the south-western zone of Nigeria. The survey covered Lagos, Ogun, Oyo, Osun, Ondo, Ekiti, Kwara and Edo states. On the spot interviews were conducted with key informant to cross-check information provided. The study analyse the operating requirements of the business, investment and financial requirement for a period of 5 years (2010-2015), prepared a detailed financial analysis using financial forecast of operations with some baseline information and assumptions in production plan to prepare a guide for expanded business operation and new investment in the sawmill industry. Adjustments were made for inflation and separate additional calculations made for annual increase in production.

Data Analysis

The economic evaluation of the production plan assumed that the machinery and materials in the sawmill have Lumber recovery factor of 45% of cubic foot of hardwood round logs (RMRDC,2009), and 58% lumber recovery factor from sawn wood using a multiple rip saw machine on one shift per day (Larinde, 2008). With the standard set above, and assuming a year of 300 working days, 1.08m³ daily production of SPWP, 324m³ of SPWP will be produced in a year. It is also assumed that 10% increase in production will be encouraged and implemented, so as to increase the company turnover. Sales price of SPWP used is the average price of sales price from year 2014 -2015 (US\$500/m³), 1USD = #180:00. This is because price change from time to time. Other Assumptions: 10% of annual depreciation of machine and equipment, 5% increase in contingencies, 10% increase in operating expenses, 100% of further investment cost will be sourced through loan and 26% interest charged on loan (commercial bank rate in Nigeria) and Fifty million naira will be sourced through loan.

Results

Table 4 showed employment opportunities that may enhanced by engaging in value-added wood products in the sawmill, there are inherent employment opportunities for about 26 workers in addition to the present status of 5 – 7 workers, at the same time provide technical skills to the youths in the local economy and sustain livelihood.

Table 1: Pre-Production Expenses

S/NO	Title	Amount
1	Company Formation Expenses	50,000.00
2	Feasibility Study Cost	400,000.00

3	Others	50,000.00
	Total	500,000.00

Table 2: Fixed capital Expenses

S/No	Title	Amount
1	Land Preparation & Survey	1,500,000.00
2	Building Cost (Offices, Stores & Open W/Shop)	2,500,000.00
3	Multiple-rip saw Machine (fairly used)	4,500,000.00
4	Cross-cutting Machine (2nos) (fairly used)	500,000.00
5	Trimming Machine	500,000.00
6	Binding Machine	300,000.00
7	Sharpening Machine	100,000.00
8	Swage	50,000.00
9	Hand-binding Machine	20,000.00
10	Generator (Lister) 130kv	5,000,000.00
11	Electricity Installation	150,000.00
12	Bore hole drilling	350,000.00
	Total	15,470,000.00

Table 3: Working Capital

S/No	Title	Amount
1	Circular Saw Blades	420,000.00
2	Binding Rope and Pins	100,000.00
3	Diesel	192,000.00
4	Electric consumption	120,000.00
	Total	832,000.00

Table 4: Personnel Cost

Title	Quantity	Rate ₦	Monthly ₦	Annually ₦
Sawmill Manager	1	45,000	45,000	540,000
Production Officer	1	35,000	35,000	420,000
Accounts Clerk	1	25,000	25,000	300,000
Production Clerk	1	18,000	18,000	216,000
Technician	2	15,000	30,000	360,000
Wood Machinist	3	15,000	45,000	540,000
Grading officer	2	15,000	30,000	360,000
Casual Workers	12	10,000	120,000	1,440,000
Factory Cleaner	1	8,000	8,000	96,000
Security Guard	2	12,000	24,000	288,000
Total	26		380,000	4,560,000

Table 5: Summary of Total Cost and Revenue from Year 1 - 5

S/N	Forest Leafy Vegetables	Year 1		Year 2		Year 3		Year 4		Year 5	
		Cost	Revenue	Cost	Revenue	Cost	Revenue	Cost	Revenue	Cost	Revenue
1	Fixed cost Pre-production Expense Fixed capital Expenses	500,000.00 15,470,000.00									
2	Working Capitals & Personnel cost	5,392,000.00		5,931,200.00		6,524,320.00		7,176,752.00		7,894,427.20	
3	Wood Raw Material	30,278,000.00		33,305,800.00		36,966,960.00		40,663,656.00		44,730,021.60	
4	Contingency 5%	2,582,000.00		1,961,850.00		2,174,564.00		2,392,020.40		2,631,222.44	
	Depreciation 10%	3,094,000.00		3,094,000.00		3,094,000.00		3,094,000.00		3,094,000.00	
5	Sub-Total A	51,962,000.00		44,313,250.00		45,665,844.00		50,232,428.40		55,255,711.24	
6	Finished		51,030,000.00		56,133,000.00		61,746,300.00		67,950,300.00		74,713,275.00

7	Waste Products	1,500,000.00	1,650,000.00	1,815,000.00	1,996,500.00	2,196,000.00
8	Sub-Total B	52,530,000.00	57,783,000.00	63,561,300.00	69,946,800.00	76,909,275.00
9	Profit Sub-Total (B-A)	52,530,000.00 - 51,962,000.00 = 568,000.00	57,783,000.00 - 44,313,250.00 = 13,471,750.00	63,561,300.00 - 46,254,700.00 = 17,895,456.00	69,946,800.00 - 50,232,428.40 = 19,714,371.60	76,909,275.00 - 55,255,711.24 = 21,653,563.76

Table 6: Percentage Change in Total Cost and Revenue over the 5years

Year	Cost	Revenue	Incremental Benefit	RORI
1	51,962,000.00	52,530,000.00	568,000.00	1.09%
2	44,313,250.00	57,783,000.00	13,471,750.00	30.40%
3	45,665,844.00	63,561,300.00	17,895,456.00	39.18%
4	50,232,428.40	69,946,800.00	19,714,371.60	39.24%
5	55,255,711.24	76,909,275.00	21,653,563.76	39.18%
Total	247,429,233.64	320,730,375.00	73,301,141.36	29.62%

The analysis in Table 6 shows the trend of return on investment. The business had a low RORI (1.09%) in the first year, this indicates that the production was merely above break-even point and with little positive return in investment; this was a result of high additional fixed capital expenditure. But as from the second year it produces high positive return on investment. The table further revealed that from the second year of production, the rate of return on investment would be able to pay back the loan when

compared with the minimum lending rate of 26% in most commercial banks, the enterprise is viable and is highly recommended if investment will be financed by bank loan. Popoola (2014) noted that there is need for the encouragement of Small and Medium Forest Enterprises (SMFEs) to overcome financial distress and improve efficiency to enable them contribute significantly to employment, poverty reduction and sustainable livelihoods.

Table 7: Financial Plan For Furniture Component For Five Years

Items	Years					
	0	1	2	3	4	5
A. Income						
Sales						
Bank Loan (Assumption)	50,000,000.00	52,530,000.00	57,783,000.00	63,561,300.00	69,946,800.00	76,909,275.00
Total A						
B. Expenditure						
Fixed Capital		15,470,000.00	5,931,200.00	6,524,320.00	7,176,752.00	7,894,427.20
Working Capital		5,392,000.00	33,305,800.00	36,636,380.00	40,300,018.00	44,330,091.80
Wood purchase		30,278,000.00	1,961,850.00	2,158,035.00	2,373,838.00	2,611,222.35
Contingency		2,582,000.00	10,000,000.00	10,000,000.00	10,000,000.00	10,000,000.00
Loan Repayment		13,000,000.00	10,400,000.00	7,800,000.00	5,200,000.00	2,600,000.00
Interest of Loan		61,868,000.00	51,619,250.00	50,371,844.00	52,338,428.40	54,761,711.24
Total B						
Income A		52,530,000.00	57,783,000.00	63,561,300.00	69,946,800.00	76,909,275.00
Cash Expenses		64,962,000.00	54,713,250.00	53,465,844.00	55,432,428.40	57,855,711.24
Annual Surplus (Shortage)		-12,432,000.00	3,069,750.00	10,096,456.00	14,512,371.60	19,053,563.76
Opening Bank Balance		52,530,000.00	-12,432,000.00	-9,362,250.00	734,206.00	15,246,577.60
Closing Bank Balance		-12,432,000.00	-9,362,250.00	734,206.00	15,246,577.60	34,300,141.36

Sources: Field work, 2015

Table 8: Estimated Discounted Cash Flow Analysis

Year	Cost (N)	Revenue (N)	Incremental Benefit (N)	Discount Factor 26%	NPV (26%)	Discounted Cost	Discounted Revenue	Discount Factor 30%	NPV (30%)
1.	51,962,000.00	52,530,000.00	568,000.00	0.794	450,992.00	41,257,828.00	41,708,820.00	0.769	436,792.00
2.	44,313,250.00	57,783,000.00	13,471,750.00	0.630	8,487,202.50	27,917,347.50	36,403,290.00	0.592	7,975,276.00
3.	45,665,844.00	63,561,300.00	17,895,456.00	0.500	8,947,728.00	22,832,922.00	31,780,650.00	0.455	8,142,432.48
4.	50,232,428.40	69,946,800.00	19,714,371.60	0.397	7,826,605.52	19,942,274.07	27,768,879.60	0.350	6,900,030.06
5.	55,255,711.24	76,909,275.00	21,653,563.76	0.315	6,820,872.58	17,405,549.04	24,226,421.62	0.269	5,824,808.65
Total	247,429,233.64	320,730,375.00	73,301,141.36		32,533,400.60	129,355,920.61	161,888,061.22		29,279,339.19

Sources: Original, 2005

NPV @26% = 32,533,400.60

NPV @ 30% = 29,279,339.19
 B/C = $\frac{161,888,061.22}{129,355,920.61}$ = 1.25

Discounted Cash Flow

Table 8 showed that at end of the five year, the present value of benefit (revenue) is ₦ 161,888,061.00 while the present value of cost is ₦ 129,355,920.61 and Net Present Value is ₦ 32,533,400.60 with 26% interest rate and Benefit-Cost Ratio of 1.25. From the above it is recommended that the project is worth investing on because the Net Present Value (NPV) at 26% discount factor is positive and the Benefit/Cost is greater than 1. Discount factor of 26-30% is used because the on-going interest rate in most commercial bank in Nigeria ranges between 26% and 30%. The above analysis shows the trend of return on investment. The business was run at a loss in the first years, this indicate that the production was below break-even point and so could in no circumstances produce positive return in investment. But as from the second year it produces positive return on investment. The return from the project is 29.62% of Interest Rate of Return (IRR), 5 years pay back periods. Thus the furniture parts and component has a very appealing and high potential to invest in Nigerian sawmill industry.

Conclusion

The result from the study showed the opportunity of the vertical integration is very attractive with pleasing return and not much risk. Nigerian rainforest belt which has thriving sawmill is an attractive place to develop furniture part and component from sawn hardwood production of quality wood biomass, the mill are close to deep sea ports where they can be exported to growing Asian markets and some part of Europe and south-Africa. Exporting processed wood as furniture part and component is a possibility that has not been widely explored until now. The gains from vertical integration of sawmill depend greatly upon local conditions, and it is difficult to reach general conclusions, however the technical factors, which are the fundamentals of manufacturing economics follow same or similar patterns. It important to note that despite the economic feasibility of integration the general growth factor and government policies should also be considered since possible gains from integration are influenced by external factors due to the dynamic nature of the price and cost structure as well as forces of demand and supply. Findings from the study indicated that profitability can be optimized in the sawmilling industry by integration of further processing, hence

government should encourage further investment in sawmill industry by making import duties to machinery and equipment needed in this sector free, or reduced.

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