

A preliminary evaluation of the economic feasibility of artisanal milling in Ghana

Based on the Economic Analyses of an artisanal mill piloted under the EU chainsaw milling project in Ghana



S E N S E

economic | business | development

M a k i n g s e n s e o f d e v e l o p m e n t

Michiel Arnoldus

September 2014

1. Introduction

Artisanal milling has been introduced in Ghana as an alternative to illegal chainsaw milling that supplies more than 80% of timber products to the domestic timber market. The EU chainsaw milling project supports artisanal milling pilots and has hired Sense to help analyze the business model for artisanal milling and develop a business plan.

In June 2014, a one-week training was organized in Kumasi, Ghana, where various business models piloted under the project (artisanal milling, plantation development and charcoal production) were discussed and analyzed. This training was followed up by a workshop in September 2014, to finalize the business plans and excel business models for the financial calculations. This report presents the preliminary evaluation of the economic feasibility of artisanal milling in Ghana based on the financial assessment of an artisanal mill piloted under the EU chainsaw milling project.

A first financial analysis of the artisanal mill was done, including an analysis of its Profit & Loss statements. A closer analysis was done of the profitability of each specie and quality of timber. The analyses revealed a gross margin of only 7%, which will not be enough to make a profit once the fixed costs are taken into account. Possibilities for increasing the sales prices and reducing costs were discussed.

2. Gross margin

The gross margin (sales revenues minus all variable costs) of the artisanal mill was found to be only 7% (including a provision of 5% bad debt) or 12% if all customers pay cash (Figure 2). This does not include the interest expenses on the 100% deposit of the logs for several months. Once the fixed cost are taken into account (salaries of management, depreciation and maintenance on buildings, equipment, vehicles and office equipment, interest etc.) the business runs at a loss (Figure 2).

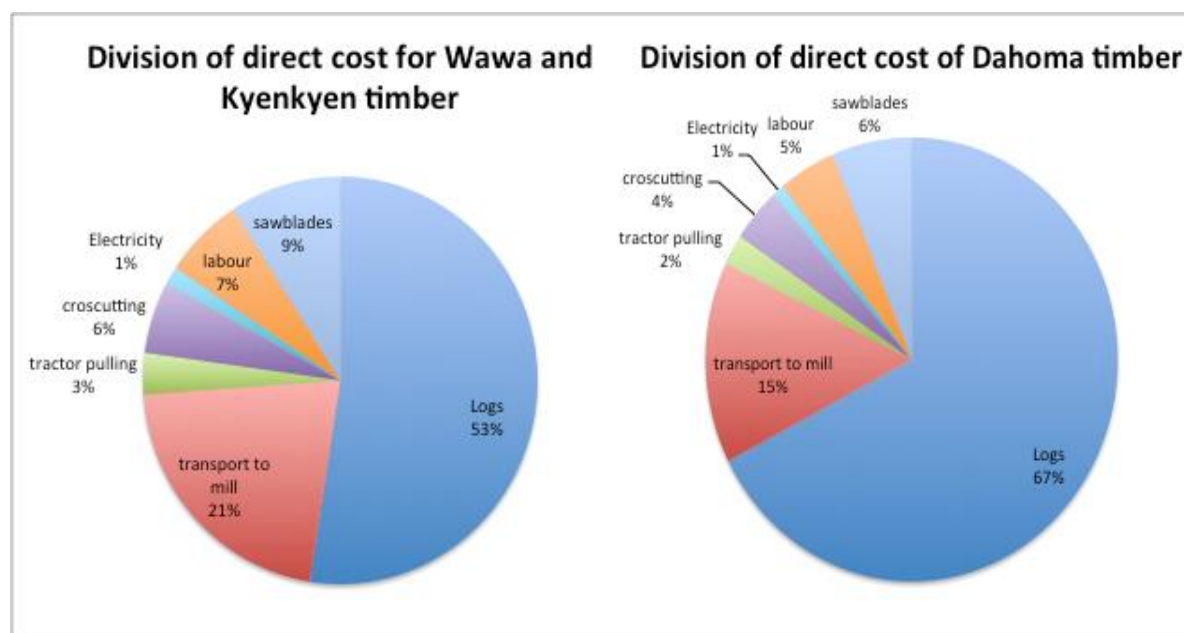
Analyses of the margins of different species and 1st and 2nd grade and the cost price provided the following insights:

- 2nd grade timber is currently sold at a loss (table 1).
- Margins on soft wood, e.g. Wawa, are much better than those on hardwoods, e.g. Dahoma (table 1&2). The higher sales prices for these woods are not enough to compensate for the higher log prices. For example the sales price of Danta timber is 21% higher than Wawa, while the log price is 81% higher.
- Between 52% and 67% of the variable cost of 1m³ of timber (depending of the specie) is the log price. Once transport to the mill is added, this comes to 73% to 80% (Figure 1).

Table 1: Gross margin per product for a pilot artisanal mill

Specie	1st & 2nd	1st grade	2nd grade
Esa	23%	35%	-22%
Wawa/ Kyenkyen	36%	48%	-18%
Dahoma	6%	19%	-38%
Danta	6%	23%	-72%

Figure 1: Direct cost division of Wawa and KyenKyen and Dahoma Timber



In this particular case there are some potential solutions:

1. Increase sales prices, particularly those of 2nd grade products and hardwood species such as Danta and Dahoma.
2. Decrease production cost. Because the purchasing cost for the logs accounts for 53% to 67% of the logs and the transport of these logs for a further 15% to 21%, this is where a cost reduction would need to take place. This means either the purchasing price of the logs needs to come down, or the transport cost of these logs.
3. Only process species that have a good margin, in this case Wawa, Esa and Kyenkyen.
4. Decrease the amount of second grade timber through better processing.

Table 2: detailed overview of the direct cost per product of a pilot artisanal mill

Danta	1st grade	2nd grade	1st and 2nd
Logs	250,0	250,0	250,0
transport to mill	54,3	54,3	54,3
tractor pulling	8,3	8,3	8,3
croscutting	14,5	14,5	14,5
Electricity	3,6	3,6	3,6
labour	16,7	16,7	16,7
sawblades	23,2	23,2	23,2
Total direct cost	370,6	370,6	370,6
sales price	484,4	215,3	394,7
Gross margin	113,7	-155,4	24,0
	23%	-72%	6%

Wawa/ kyenkyen	1st grade	2nd grade	1st and 2nd
Logs	133,3	133,3	133,3
transport to mill	54,3	54,3	54,3
tractor pulling	8,3	8,3	8,3
croscutting	14,5	14,5	14,5
Electricity	3,6	3,6	3,6
labour	16,7	16,7	16,7
sawblades	23,2	23,2	23,2
Total direct cost	254,0	254,0	254,0
sales price	484,4	215,3	394,7
Gross margin	230,4	-38,7	140,7
	48%	-18%	36%

Esa	1st grade	2nd grade	1st and 2nd
Logs	141,7	141,7	141,7
transport to mill	54,3	54,3	54,3
tractor pulling	8,3	8,3	8,3
croscutting	14,5	14,5	14,5
Electricity	3,6	3,6	3,6
labour	16,7	16,7	16,7
sawblades	23,2	23,2	23,2
Total direct cost	262,3	262,3	262,3
sales price	403,6	215,3	340,9
Gross margin	141,3	-47,0	78,5
	35%	-22%	23%

Dahoma	1st grade	2nd grade	1st and 2nd
Logs	250,0	250,0	250,0
transport to mill	54,3	54,3	54,3
tractor pulling	8,3	8,3	8,3
croscutting	14,5	14,5	14,5
Electricity	3,6	3,6	3,6
labour	16,7	16,7	16,7
sawblades	23,2	23,2	23,2
Total direct cost	370,6	370,6	370,6
sales price	457,5	269,1	394,7
Gross margin	86,8	-101,5	24,0
	19%	-38%	6%

Increasing sales prices

According to entrepreneurs the possibilities to increase sales prices are limited. Although construction companies are willing to pay for quality lumber, it was claimed that there are many small-scale sawmills that can produce quality lumber from illegal logs. These companies put a downward pressure on market prices for quality lumber in the Accra market, the main market for quality timber. The market in Kumasi for quality lumber according to the entrepreneurs is too small. There is a clear demand for legal lumber from companies working for the public sector, but according to most participants it is too easy for saw mills to produce fake documentation that make illegal timber look like it is legal. The general consensus was that as long as there is no law enforcement whatsoever it will not be possible to increase sales prices of legal timber.

It would be good to explore the opportunity of finding clients that are willing to pay a higher price. Market research in the Kumasi market showed that there is a shortage of quality timber there. Furthermore the volume output from the pilot mills are so small compared to the overall size of the market that it should be possible to find 2 or 3 large construction companies who really need verified legal quality timber. However, more market research is needed to confirm this.

Decreasing costs or limit production to profitable species

Given the fact that each mill can take one truckload of logs per week, it will probably not be cost effective to own a vehicle to reduce transport costs. Only once 3 mills are running this may be considered. However, it could make sense for the Akrodie Artisanal Millers Association to own a truck.

This means the only real option for the artisanal mill to reduce costs is to renegotiate lower prices with the supplier LLL¹. Furthermore paying more than 20% premium for hardwoods is not possible. If the price difference stays at this level, the artisanal mill should refuse to take species such as Danta and Dahoma.

Finally, paying a 100% deposit on logs that are supplied only month later is not economically feasible or sustainable. Given the fact that the interest rate on working capital is around 25%, paying a 100% deposit for 3 months equals to an added cost of 6.25% to each log. Furthermore paying a 100% deposit is highly unusual in any industry, because after all the money is paid there is no incentive for the supplier to deliver the product.

Reducing 2nd grade

Many options for reducing 2nd grade were discussed, but no possibility found. It was proposed that once a log is sawn and one has found large defects it would be cheaper to stop processing. However, at that point 80% of costs to produce timber have already been made. Hence one cannot afford not to process a log, no matter how bad it is, once it is in the mill.

3. Conclusion: the competitiveness of artisanal milling

Artisanal mills currently operate at a loss. The large amounts of illegal timber, particularly quality timber, reduce the sales prices. Because the raw material cost for mills processing illegal lumber are lower, they can sell the timber at lower prices. The log price alone accounts for 53% to 67% of the direct cost of timber, and illegal operators only have a fraction of this cost. The competitive advantage of illegal operators increases as the value of the log increases, because the cost of a stolen log only depends on the cost of chainsaws, labour and transport. Legal artisanal mills on the other hand pay a premium for hardwood species. Because illegal timber is up to 90% of the market, prices are determined by illegal timber. Sense estimates that illegal operators using a Woodmizer or another portable sawmill currently have a gross margin of around 40% for softwood and 60% for hardwoods.

For artisanal mills to become more competitive in the long run, the law would have to be better enforced. Stronger enforcement would reduce the supply to the market and/ or increase the cost of (illegal) operators that would increase the market prices for timber. In addition better contracts with logging operators need to be negotiated, with lower

¹ The association entered into an agreement with the company Logs and Lumber Limited (LLL) in July 2013. Under the agreement LLL will supply logs to the artisanal milling groups and in return, have the groups protect its forest concessions against illegal chainsaw milling.

prices all around, lower price premiums for hardwood species, a lower deposit and faster delivery off logs.

In the short run artisanal mills could become more competitive by finding market niches willing to pay a significant price premium for legal, quality timber. More market research is needed to establish if such niches exist and where they are.

Figure 2: 5-year profit & loss statement for a pilot artisanal mill

	0	1	2	3	4
REVENUES					
Esa	47.720	114.528	114.528	171.792	171.792
Wawa/ kyenkyen	42.697	102.472	102.472	153.709	153.709
Dahoma	55.255	132.611	132.611	198.917	198.917
Danta	55.255	132.611	132.611	198.917	198.917
Charcoal	8.400	20.160	20.160	30.240	30.240
TOTAL REVENUES	200.926	482.223	482.223	723.335	723.335
VARIABLE COST					
Raw Material cost	108.500	260.400	260.400	390.600	390.600
Milling cost					
Transport to mill	30.435	73.043	73.043	109.565	109.565
Tractor pulling	4.667	11.200	11.200	16.800	16.800
Crosscuts	8.116	19.478	19.478	29.217	29.217
Electricity	2.026	4.862	4.862	7.293	7.293
Manual labour	9.333	22.400	22.400	33.600	33.600
Saw blades	12.986	31.165	31.165	46.748	46.748
Milling cost	67.562	162.149	162.149	243.223	243.223
Bad Debts	10.046	24.111	24.111	36.167	36.167
TOTAL VARIABLE COST	186.108	446.660	446.660	669.990	669.990
GROSS MARGIN	14.818	35.563	35.563	53.345	53.345
%	7%	7%	7%	7%	7%
Indirect cost					
Staff	21.540	59.760	59.760	59.760	59.760
Professional Services	0	0	0	0	0
Certification	500	500	500	500	0
Taxes and levies	400	0	0	0	0
Maintenance & Insurance	0	0	6.480	6.480	7.210
Staff training	0	0	0	0	0
General energy & utilities cost	150	300	300	300	300
Marketing & communication cost	3.000	3.000	3.000	4.000	4.000
Telecommunication cost	3.000	3.000	3.000	4.000	4.000
Research & Development	0	0	0	0	0
Unforeseen	413	410	1.068	1.188	1.211
TOTAL FIXED COST	29.003	66.970	74.108	76.228	76.481
EBITDA	-14.184	-31.407	-38.545	-22.883	-23.136
Depreciation					
Buildings	-	-	5.500	5.500	6.000
Machinery	-	-	9.200	9.200	13.400
Vehicles	-	-	12.500	20.500	20.500
Office equipment	-	-	1.800	1.800	1.800
TOTAL DEPRECIATION	0	0	29.000	37.000	41.700
EBIT	-14.184	-31.407	-67.545	-59.883	-64.836
Interest					
Long term loans	0	0	0	0	0
Working capital loans	0	0	0	0	0
TOTAL INTEREST	0	0	0	0	0
Profit Before Tax	-14.184	-31.407	-67.545	-59.883	-64.836
Profit %					
Tax	-	-	-	-	-
NET PROFIT	-14.184	-31.407	-67.545	-59.883	-64.836
%	-7%	-7%	-14%	-8%	-9%

This report is an edited version of the report of the training facilitated by Michiel Arnoldus of Sense, analyzing the various business models (artisanal milling, plantation development and charcoal production) piloted under the EU chainsaw milling project in Ghana. More information about the training on developing business plans and in financial analyses business can be obtained from Michiel Arnoldus of Sense (michiel@timeforsense.com) and about the various business models piloted under the EU chainsaw milling project from James Parker Mckeown of Tropenbos International Ghana (jparkmckeown@gmail.com).

Sense is an organization that aims to provide a more secure livelihood for people in developing countries through support of entrepreneurs in building self-sustaining businesses (www.timeforsense.com).

The EU chainsaw milling project (www.chainsawmilling.org) aims to find sustainable solutions to the problems associated with the production of lumber for local timber markets by involving all stakeholders in dialogue, information gathering and the development of alternatives to unsustainable chainsaw milling practices. In Ghana this project is being carried out by Tropenbos International (TBI) in collaboration with the Forestry Research Institute of Ghana (FORIG) and the Forestry Commission (FC).