



Chainsaw Milling in Ghana

Context, drivers and impacts

Emmanuel Marfo





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The mission of Tropenbos International (TBI; www.tropenbos.org) is to improve tropical forest management for the benefit of people, conservation and sustainable development. By making knowledge work for forests and people, TBI contributes to well-informed decision making for improved management and governance of tropical forests. TBI's longstanding local presence and ability to bring together local, national and international participants make it a trusted partner in sustainable development.

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Foreword

Ghana has gone through several experiments of accommodating chainsaw milling as a means of producing timber, especially for domestic consumption. Before the 1990s, chainsaw operations in Ghana were legal, with almost no controls. When it was realized that tree-felling was indiscriminate and was inconsistent with sustainable forest management practices, chainsaw milling became regulated by law. The control measures were abused, however, both by operators and by forestry and local government officials; this led to higher than expected levels of exploitation. By 1998, the abuse was so extensive that the government thought the best option was to completely ban chainsaw milling.

For a decade or so since the ban, no drastic crackdown on the activity has systematically been enforced; in fact, chainsaw operations have been on the increase, flooding the local market with cheap timber. More recently, chainsaw operations have extended to supply the timber needs of neighbouring countries. The failure of some sectoral policies, especially those geared towards supplying legal timber to the domestic market, contributed to this situation.

The evidence is compelling that policy decisions are needed that will contain this activity and bring timber harvesting in Ghana to sustainable levels. It is imperative to design effective and appropriate interventions, since they will have serious social, economic and political implications.

For the past five years or so, in the face of what seems to be another round of policy failure with respect to chainsaw milling, there have been increasing efforts to discuss and implement strategies to deal with chainsaw milling. Various studies identified the same issues, albeit with varying circumstances. For a policy discussion to be feasible, especially when it needs to be supported by research, it is essential to obtain a consistent view that reconciles the facts.

This report synthesizes the various studies related to chainsaw milling in Ghana. The synthesis provides a comprehensive knowledge base which can be deployed by various stakeholders for evidence-based decision making. Whichever policy options may emerge, the information contained in this study can provide the way forward for improved decisions on the sustainable exploitation of Ghana's forest resources.

Related to the goal of sustainable forest management is the need to ensure that forest exploitation is within the Annual Allowable Cut and that timber in the domestic market is legal, especially under a Voluntary Partnership Agreement regime. The Forestry Commission stands to benefit tremendously from this synthesis; the commission's day-to-day planning of initiatives in support of policy will be informed by the report's wealth of empirical observations.



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Preface

Chainsaw milling — the on-site conversion of logs into lumber for commercial purposes using chainsaws — has been prohibited in Ghana since 1998 but remains widespread despite measures put in place by government to enforce the ban. Chainsaw milling is the main issue on the illegal logging agenda in Ghana.

Illegal logging is an important subject in the dialogue on global forest policy. Recently, and at an accelerating pace, development assistance to forestry has been focused on suppressing illegal logging. A series of international initiatives has been launched, including the EU Action Plan for Forest Law Enforcement, Governance and Trade (FLEGT) in 2003; regional FLEG processes (Asia, 2001; Africa, 2003; Europe and North Asia, 2005; Latin America, pending) and a number of bilateral agreements allied to FLEGT. The latter include the negotiation of Voluntary Partnership Agreements (VPAs) between the EU and a number of timber-producing countries, including Ghana, on the legality of timber they export to the EU.

In September 2008, Ghana was the first country to sign a FLEGT Voluntary Partnership Agreement with the EU. The VPA includes timber production for the domestic market. This poses a challenge, since illegal chainsawn wood provides 80% of the supply for the domestic market. In November 2009, the EU-Ghana Voluntary Partnership Agreement was the first one to be ratified under the EU FLEGT Action Plan.

Tropenbos International (TBI), in collaboration with the Forestry Research Institute of Ghana (FORIG) and Ghana's Forestry Commission (FC), is implementing an EU-funded project, "Developing alternatives for illegal chainsaw milling through multi-stakeholder dialogue in Ghana and Guyana." This EU-TBI chainsaw milling project aims to find sustainable solutions for the problems associated with the production of lumber for the local timber market in Ghana. It involves all stakeholders in dialogue, information gathering and the development of alternatives to unsustainable chainsaw milling practices.

The project's overall objectives are to reduce poverty and promote viable livelihoods in forest-dependent communities; reduce the occurrence of illegal logging; and promote the conservation and sustainable management of tropical forests. Its goal is to reduce the level of conflict and illegality related to chainsaw milling by local communities. The project is expected to have several results:

- a better understanding of the causes and consequences of chainsaw milling and its links with illegality;
- determination of international best practices to address chainsaw milling;
- establishment of multi-stakeholder processes to discuss chainsaw milling issues; and
- achievement of a national consensus in Ghana (and Guyana) on issues related to chainsaw milling using an institutionalized mechanism for ongoing dialogue between stakeholders.

FORIG facilitated and carried out research to provide reliable information and analysis to support the project and the multi-stakeholder dialogue process. The institute undertook research on case studies related to chainsaw milling in Ghana and carried out an information gap analysis. The case studies were grouped into five main study areas:

1. **Background information**
 - genesis of chainsaw milling;
 - technology and practice over the years; and
 - evolution and effectiveness of policy measures, transformation of sector institutions over the years and structure of chainsaw enterprises.
2. **Chainsaw milling compared to sawmilling**
 - total chainsawn lumber production over time;
 - total lumber production by sawmills over time; and
 - recovery factors (efficiency), geographical distribution of CSM and employment.
3. **Drivers of chainsaw milling**
 - market forces;
 - financing of chainsaw practice;
 - tenure factors and availability of resources;
 - emergence of community-based enterprises;
 - economic conditions and financial incentives; and
 - determinants of operation sites, political factors and other drivers.
4. **Analysis of policy and legal framework**
 - adequacy and consistency; and
 - effectiveness of implementation (institutional and other factors).
5. **Impacts of chainsaw milling**
 - economic impacts (cost-benefit analysis);
 - effects on rural livelihoods and economies;
 - distribution of benefits (benefit flow); and
 - environmental and social impacts and conflicts associated with chainsaw milling.

In May 2009 FORIG completed the case study report on CSM in Ghana (see Marfo, Adam and Obiri 2009), which contained 13 specific research activity reports.

This synthesis report was compiled in order to help disseminate information about the issue. It builds on the FORIG case study report and on all major studies and reports on chainsaw milling in Ghana with a view to presenting a comprehensive overview of the situation. The synthesis will be useful for both national and international stakeholders, particularly those involved in policy dialogue processes (including those between Ghana and the EU).

Executive Summary

This report synthesizes the various studies and discussions that have been carried out on chainsaw milling (CSM) in Ghana. It is targeted to policymakers, researchers and indeed all stakeholders, both in Ghana and elsewhere. It is intended to provide up-to-date information about chainsaw milling in Ghana. It builds on various reviews and studies conducted between 2005 and 2009 (Odoom 2005; Adam et al. 2007a, b and c; Marfo, Adam and Obiri 2009; and TIDD/FORIG 2009), and on papers presented at an African regional workshop on chainsaw milling, held in Accra on 25–26 May 2009 (TBI 2009).

Although CSM for commercial purposes is prohibited by the Timber Resource Management Regulations of 1998 (Legislative Instrument 1649), the activity has thrived. It provides jobs for about 130,000 Ghanaians and livelihood support for about 650,000 people. CSM enjoys much public support, and many stakeholders — including more than half of District Forest Managers — think the ban should be reviewed.

The demand for timber and the conventional sawmill industry's inability to supply the domestic demand by legal means remains the principal driver not only of CSM but also of illegality in the timber industry in general. It has been difficult to implement the CSM ban for several reasons:

- the demand for jobs for both rural youth and urban timber businesses;
- corruption among forestry officials, police and the joint FSD-military task force;
- political interferences in FSD operations;
- lack of political will to enforce the ban and implement alternatives; and
- strong support for CSM by local communities, particularly farmers — the practice brings in about Ghana cedi (GHC) 33.6 million per year in the form of informal payments, most of which benefit FSD officials, police, farmers and chiefs (at time of writing, 1 US\$ = 1.4 GHC).

CSM is the main supplier of lumber to the domestic market. It contributes about 84% of this lumber, with an estimated volume of 497,000 m³ and a market value of about GHC 279 million. The urban financiers who support CSM operations capture about 28% of this revenue; rural-based operators receive 19%. CSM provides an average profit of about GHC 67 per m³ of lumber. A projected aggregate annual profit of GHC 37 million is realized across the CSM trade chain. Chainsaw milling is also the major supplier of lumber for overland export to neighbouring countries, with an estimated volume of 260,000 m³.

The study demonstrates that chainsawn lumber is 12–74% cheaper than conventional sawmill lumber, depending on species, dimension and quality. The CSM sector processes about 72 species in more than 100 dimensions. It processes an estimated 840,000 trees a year with a roundwood volume of about 2.5 million m³, exceeding Ghana's Annual Allowable Cut (AAC) of 2 million m³ for the formal industry. CSM recovers about 30% of tree volume, a lower rate than improved CSM with Logosol attachments (33%), Wood-Mizer portable sawmills (56%) and sawmills (38%).

Ghana loses a possible GHC 25 million annually in stumpage revenue from trees illegally harvested by chainsaw operators; illegal tree sales by farmers to operators are equivalent to about 38% of this amount (GHC 9.5 million).

The supply of legal timber to the domestic market is the most crucial issue in addressing the problems associated with illegal CSM. Three policy options are recommended to this end:

- the legal sawmill industry supplies all timber;
- the industry shares the market with artisanal groups applying improved forms of CSM such as the use of Logosol; and
- artisanal groups supply all timber.

This synthesis provides some reflections on these options. Equitable benefit-sharing to include farmers, tree tenure reforms and provision of competitive alternative livelihood schemes are crucial in the ultimate success of any policy intervention to address CSM.



Chapter 1

Introduction

1.1 Background

The total land area of Ghana is about 23.85 million hectares (ha). Forests are confined to two vegetation zones, each with different forest types: the high forest zone (HFZ) (34%) and the savannah zone (66%; Table 1). Production forests are mainly concentrated in the southwestern part of the country; forest types range from wet evergreen to semi-deciduous. Forest lands are owned by local communities and vested in stools (chiefs and families). However, forest resources, whether in forest reserves or outside them, are managed by the Forestry Commission. Thus, even though traditional authorities are recognized as “land-owners” and receive benefits as such, they do not have any management rights over “their” forest.

Table 1. Land types in Ghana (ha)

land type	high forest zone	savannah zone	total
reserves:	1,678,800	880,600	2,559,400
degraded	390,000		
protected	350,000		
suitable for timber production	938,800		
off reserves:	6,547,100	14,747,500	21,294,600
unreserved forests, farmlands	46,600	6,576,100	6,622,700
other lands, cocoa, food farms, bush fallows	6,500,500	8,171,400	14,671,900
total	8,225,900	15,628,100	23,854,000

Source: Davies and Awudi 2001

Approximately 20% of the HFZ is occupied by forest reserves. These areas are gazetted to be managed for timber production, biodiversity or environmental conservation. About 0.39 million ha of forest reserves have been categorised as

degraded; 0.35 million ha have protected status (including hill and swamp sanctuaries, areas of high biodiversity and fire protection sites); the remainder is suitable for timber production.

Forests that are recovering from heavy logging but potentially productive are called convalescent forests; those that can be converted to other uses, including plantation forestry, are called conversion forests.

Ghana used to be rich in forest resources, and forests were an important part of the economy (Box 1). Today, the country's forest resources are highly degraded. Wildfires, agriculture and indiscriminate logging (mainly through chainsaw milling) have contributed to this process.

BOX 1. GHANA'S FORESTS

Ghana's deforestation rate is estimated to be approximately 65,000 ha per year. The country has about 216 forest reserves that are managed for protection and timber production. Substantial timber resources exist outside these reserves (in so-called off-reserve areas). The current size of reserved high forest is 1.6 million ha. In the past, at least half of the timber harvested came from off-reserve areas, although this has declined in recent years (Hansen and Treue 2008).

The formal timber industry contributes about 6% to Gross Domestic Product (GDP) and directly employs about 100,000 people. Between 2002 and 2007, Ghana earned an average of GHC* 366 million annually from export of wood products. Timber is currently the fourth contributor to Ghana's foreign exchange.

The industry has installed a log processing capacity of about five million m³ against an official Annual Allowable Cut of two million m³.

Ghana's 1994 Forest and Wildlife Policy formalised a new emphasis on sustainable forest management (SFM) and participation among stakeholders. It also includes specific guiding principles and strategies on rights of access to forests and the protection of forests and wildlife. The policy's aim is the "conservation and sustainable development of the nation's forest and wildlife resources for the maintenance of environmental quality and perpetual flow of benefits to all segments of society." As Kotey et al. (1998, 80) observed, however: "The status quo is accepted; the owners of forest reserves are recognised as having only 'beneficiary rights' and are defined as 'clients' for whom the Forestry Department [now Commission] manages the reserves."

The forest sector is governed by several pieces of legislation — including the *Forestry Commission Act of 2005 (Act 543)*, the *Plantations Development Fund Act (as*

*Note: At time of writing, 1 US\$ = 1.4 GHC (Ghana cedi)

amended) of 2002 (Act 623) and the *Timber Resource Management Act* (as amended) (Act 547 of 1998 and Act 617 of 2002) — and their legislative instruments (LI 1649 and LI 1715). Essentially, the laws outline the functions of the Forestry Commission (FC) in managing the forest resources of Ghana and prescribe the qualifications and procedures for the allocation of timber rights and participation in plantation development. The laws also prescribe the rights of local communities and the payment of forest fees by forest users. Significantly, Act 547 prohibits commercial chainsaw milling (CSM; see Chapter 2).

Timber harvesting is regulated by a maximum that is set for annual exploitation, the Annual Allowable Cut (AAC). The AAC is 2 million m³: 1.5 million m³ is expected to come from off-reserve areas; and 500,000 m³ is allowed to be taken from forest reserves. The off-reserve limit was set high due to extensive illegal exploitation and the assumption that with time the off-reserve areas would be converted for other land uses, such as farming.

The right to harvest trees is granted by the Forestry Commission in the form of permits that detail the area, volume and species to be harvested. There are three types of harvesting permits:

- Timber Utilisation Contracts (TUCs);
- Timber Utilisation Permits (TUPs); and
- Salvage Permits (SPs).

TUCs are issued by the government for the commercial exploitation of timber. Contract holders must conclude a Social Responsibility Agreement with land-owning communities. TUPs are harvesting rights given to communities for the exploitation of timber for non-commercial and development purposes.

1.2 Illegal logging and the VPA

Since chainsaw milling has been banned in Ghana since 1998, CSM activities are within the scope of efforts to combat illegal logging at the national and international level. CSM discussions have become an important part of the EC-Ghana Voluntary Partnership Agreement (VPA). The country cannot fully meet the legality assurance aspect of the agreement without addressing CSM.

This is partly due to the fact that it is suspected, supported by some evidence (TIDD/FORIG 2009) that some timber processed through chainsaw operations finds its way to sawmills for reprocessing and to the export market. Given Ghana's commitments to trade agreements such as the VPA, a policy choice must be made to either confirm the illegality of CSM and strictly enforce the law, or to review the ban and integrate CSM into the formal timber industry, while at the same time assuring the legal origin of chainsawn lumber. This decision has become more crucial than ever given the proliferation of chainsaw operations throughout the country and the substantial public discussion in the media. The enforcement of the ban, though very costly to the state, has been largely ineffective, and chainsawn lumber has become the main source of supply for the domestic market.

1.3 Public debate on chainsaw milling

Not surprisingly, there has been increased public debate about how to deal with chainsaw milling in policy and practice. In 2004, for example, Tropenbos International Ghana organised a national expert consultation workshop solely to discuss chainsaw milling. The FAO commissioned a study in 2005 to assess CSM in Ghana. These initiatives resulted in reports (TBI 2004; Odoom 2005) that revealed the complexities of CSM; it was confirmed that CSM was thriving and that enforcement of the ban had largely failed. It was recognised that there was a lack of information on the drivers and structure of CSM and on its social, economic and environmental impacts. Little information was available on the perceptions of CSM stakeholders on how to deal with the issue.

In 2005, the UK Department for International Development (DFID) funded a study on chainsaw milling and lumber trade in West Africa. This study, which included Ghana, resulted in three main reports (Adam et al. 2007a, b and c), focusing on socio-economic impacts, corruption in CSM and trade and the development of a decision support system for CSM in Ghana. During 2008–09, based on an information gap analysis, the Forestry Research Institute of Ghana (FORIG) undertook a study of CSM to provide the additional information needed to inform a policy dialogue process for finding alternatives to illegal chainsaw milling in Ghana. The study report was shared at a two-day regional workshop on chainsaw milling in May 2009 in Accra, Ghana.

This document collates and synthesises all the information available on CSM with a view to informing the multi-stakeholder dialogue process to develop policy options. It provides a summary of the most up-to-date information on chainsaw operations in Ghana, drawing on the information contained in previous studies. In particular it builds on the work of Tropenbos International (2004), Adam et al. (2007a and b), Marfo, Adam and Obiri (2009) and subsequent discussions on chainsaw milling under the EU-TBI chainsaw milling project (Table 2).

1.4 Main approaches followed in previous studies

The national focus-group discussion workshop in 2004 was attended by more than 100 people from all major stakeholder groups; ten invited papers were presented and group discussions were held, and the proceedings were published (TBI 2004).

The DFID-funded study on chainsaw milling and lumber trade in West Africa was carried out by FORIG in collaboration with Aberdeen University over two years with a research team of eight core members.

The TIDD/FORIG market survey, commissioned under the Natural Resources and Environment Governance program, was carried out within a period of about two months with four technical teams.

The Ghana case study from the EU-TBI chainsaw milling project was carried out by an 11-member research team, mainly from FORIG. The details of the studies are summarised in Table 2.

Table 2. Details of case studies on chainsaw milling carried out by FORIG

project	study area*	methods used	respondents
DFID study (Adam et al. 2007a, b, c)	12	market survey, interviews and focus group discussion	360 households 8 lumber markets 79 chainsaw firms
EU-TBI chainsaw-milling project (Marfo, Adam and Obiri 2009)	8	market survey, stakeholder surveys, focus group discussions, expert round-table meeting	22 district forest managers 289 retailers 10 timber markets 300 district-level stakeholder representatives (chiefs, District Chief Executives, etc.) 85 farmers 300 operators
TIDD-FORIG market study (TIDD/FORIG 2009)	nationwide (all regions)	document review market survey	218 consumers from 37 markets 611 wood dealers in 44 markets

*Note: number of forest districts

Environmental impact studies under the EU project used field surveys and a quantitative assessment of five indicator variables in two forest reserves: disturbance to ground vegetation, canopy loss, harvesting intensity, residue generation, and recognition for protection of immature trees, waterbodies and agricultural crops. The project measured the processing efficiency of chainsaws, chainsaws with attachments and Wood-Mizer milling using four species of different density classes replicated in three trees per species.

1.5 Scope of this report

This report is organised into six chapters. The introductory chapter gives a brief history behind the work and objectives and a brief review of the methods used in previous studies. Chapter 2 describes the evolution of CSM in Ghana and the policy responses over the years. It ends with an overview of the major players involved in CSM policy debates and operations. Chapter 3 reports on the current situation of chainsaw milling, focusing on production, transport and marketing. It also includes financial aspects such as investment sources, production costs, profits and distribution of revenue. Chapter 4 looks at the factors that drive CSM. The social, economic and environmental impacts of CSM are discussed in Chapter 5. Chapter 6 draws out the main conclusions from the various studies analyzed and presents a set of recommendations and a range of alternative options, particularly those relevant to multi-stakeholder processes.



Chapter 2

Evolution of chainsaw policy

2.1 Historical development

Until 1998, chainsaw milling (CSM) was a legal activity regulated by law. Since then, CSM — including transportation and trade of its products — has been illegal. Table 3 summarises the definition of legal timber in Ghana.

Chainsaws were introduced in Ghana in the 1960s and gradually replaced the use of manual saws for felling and crosscutting trees. Chainsaw milling became widespread in the early 1980s as sawmill operations decreased along with a nationwide economic decline. As chainsaw milling increased in the commercial sector, it was recognised as an important socio-economic activity and government attempted to regulate it. This led to the promulgation of the Trees and Timber (chainsaw operations) Regulation of 1991 (LI 1518), which allowed District Assemblies (DAs) to register chainsaws and, in collaboration with District Forestry Offices (DFOs), to issue permits for the felling and milling of trees. DAs also registered chainsaws and processed and approved applications for felling. DFOs received applications, conducted inspections and made recommendations to the DA on the suitability of the application. The Forest Product Inspection Bureau (FPIB), who conducted road checks, received copies of registrations and permits.

The decentralization of regulating operations led to the indiscriminate felling of trees, abuse of permits by both DAs and operators and a lack of cooperation between the DA and the DFO (Kotey et al. 1998; Adam et al. 2007a). The resulting depletion of forest resources and increasing environmental degradation became a public concern, prompting policy interventions.

Table 3. Definition of legal timber in Ghana

source of timber	1994 FWP, 1996 FDMP, Cap 157, Act 547, Act 617, LI 1649 and Manuals of Procedures, local authority bylaws	Timber is sourced from designated productive forest reserves managed in accordance with existing management plans and from off-reserve areas that are not within a distance of 50 m from any stream or river.
resource allocation	1994 FWP, Act 547, LI 1649 and LI 1721 LI 1649 LI 1649	Allocation of timber rights is according to one of the three methods approved by legislation, namely: <ul style="list-style-type: none"> • Competitive bidding for timber rights in the form of Timber Utilisation Contracts (TUCs) on lands that are subject to TUCs; and on farms, with the consent of the farmer/s; • Timber Utilisation Permits (TUPs) for non-commercial purposes only; and • Salvage felling for an area of land undergoing development such as road construction, expansion of human settlement or cultivation of farms. All TUCs are ratified by Parliament.
harvesting operations	NRCD 273, Act 493 Logging Manual LI 1649, Logging Manual LI 1649, Logging Manual	Loggers must have a properly registered property mark (a special identity number given to registered concessionaires) from the Forestry Commission and an environmental permit or licence. A harvesting schedule is prepared for areas to be logged. Pre-felling inspections and stock surveys are conducted, resulting in availability of stocking data, including stock maps, yield list and yield maps. Allocation of yield is based on a formula that takes into consideration the felling limit of trees, forest condition score and the FC's fine-grained environmental protection standards. A five-year harvesting plan and compartment logging plan, which outlines timber harvesting standards and specifications for operations such as road and bridge construction, felling, skidding and log markings, are prepared. Timber Information Forms (TIFs) and Log Information Forms (LIFs) must be completed.
transportation	LI 1649 NRCD 243, LI 1649 Act 547	Transportation of any timber or timber product is carried out between the hours of 6 a.m. and 6 p.m. on a working day unless otherwise permitted by the FC. Valid conveyance certificates are required for logs being transported. Documentation must be available to show that the logs or timber being transported were harvested legally.

Table 3 (continued): Definition of legal timber in Ghana

processing operations	Act 571 Act 571, NRCD 243, Cap 110 Act 571, NRCD 243, Cap 110	Timber companies require valid registration with the FC. Mills must follow safety and industrial processing standards and trade guidelines during their processing operations. Mills cannot process chainsawn lumber. Logs to be processed must be covered by the necessary documents and certificates such as conveyance certificates.
markets and export	Act 571, SMCD 128, NRCD 243, NRCD 273, LI 1649	Timber to be exported must be marked with the logger's valid property mark and markings on logs or timber cannot be defaced. All dealers (including exporters) require a valid registration licence to market timber. Export permits must be available during pre-shipment inspections and examination of timber and wood products.
fiscal regime	Acts 124, 493, 547, NRCD 273, Cap 136, Logging Manual	All tax obligations of a TUC holder must be fully met. Loggers cannot be in arrears with respect to payment of fees and charges. Loggers must pay all stumpage fees with respect to harvested trees.

Source: Adapted from Agyeman, Oduro and Gyan 2007

By 1994 both timber companies and chainsaw operators carried out excessive and often uncontrolled felling in concession areas, making the regulations practically irrelevant. The situation was compounded by the various regulations issued separately by FSD and DAs. Chainsaw operators, DAs, farmers, and land-owners took advantage of the confusion and carried out much unmonitored felling. Speculative felling and trade malpractice were widespread, including illegal trading in property marks and unauthorised subletting of concessions to unlicensed timber operators. The timber industry's failure to pay royalties and other statutory fees for trees felled in both reserve and off-reserve forests also reached serious proportions. There appeared to be an almost complete lack of control over timber harvesting in the off-reserve areas, where illegal production had risen to about 80% of total timber production (Kotey et al. 1998).

2.2 Policy responses

In response to these problems, a national working group was set up in 1994 to recommend strategies to control illegal felling outside forest reserves. It consisted of the National Chainsawyers Association, timber companies, local timber task forces (FSD, concession holders, district assemblypersons, villages and military personnel), District Chief Executives, FSD District Forest Managers, stool chiefs and traditional authorities, farmers and communities and the Forestry Ministry (now the Ministry of Lands and Natural Resources). A number of interim measures were consequently adopted, one of which was the Interim Felling Procedures of 1995.

The Interim Felling Procedures, as enumerated by Smith (1996) and Kotey et al. (1998), had several key features:

- Applications to the Forestry Department (FD) for the felling of trees for community projects had to be accompanied by project documents (including a bill of quantities) approved by the DA.
- Before felling began, the trees would be inspected by the FD, DA, logger, a community representative and the farmer involved. Farmers could raise objections over a tree being felled on their farms, even in concession areas. Any tree felled on a farm against the wishes of the farmer was considered illegal.
- A Forest Officer would issue a felling permit before felling commenced.
- After felling, farmers could bring any complaints about the felling operations to the attention of the Forest Officers.
- A certificate of conveyance was issued by the FD for all logs, boards, charcoal or firewood produced for commercial sale before they were moved from the site.
- Staff at roadside checkpoints of the Timber Industry Development Division (TIDD) would stamp and sign the felling permits accompanying lumber in transit and send copies of permits to the FD each month.
- All chainsawn lumber on the market was expected to be governed at all times by the felling permits and the certificates issued by the FD and be available for inspection by either FSD or TIDD staff whenever necessary.

Odoom (2005) reviewed the measures and observed that they could not curb chainsaw operations; there were inadequate checks in the rural areas and the bulk of the chainsawn lumber that found its way into the urban markets was not inspected as required. With evidence that the Interim Felling Procedures were not helping the situation, several policy instruments were employed from about 1997 to deal with illegal timber operations.

Timber task forces — composed of the staff of FSD, police and the military — were formed in 1996 to track down culprits and confiscate chainsawn lumber, equipment and vehicles from CSM operations. This largely failed to stop illegal chainsaw operations.

The *Timber Resource Management Act, 1997* (Act 547) and its accompanying Timber Resources Management Regulation, 1998 (LI 1649) were promulgated following a major policy review of chainsaw operations (Agyeman, Agyeman and Kyere 2004), and chainsaw milling was consequently banned in 1998. Two studies have reviewed the factors that led to the ban on chainsaw milling (Kotey et al. 1998; Agyeman, Agyeman and Kyere 2004). The latter, for example, pointed out the following reasons:

- high levels of waste and inefficiency when converting logs to lumber;
- skewed economic rent that enabled wood processors to capture the lion's share of economic revenues at the expense of forest owners and local communities;

- the price of chainsawn lumber, which was cheaper than sawmilled lumber. This made chainsawn lumber attractive to the construction sector and furniture-makers who consume a large proportion of timber, thus creating a market for chainsaw operators; and
- the ban was expected to allow the Forestry Commission to be more effective in its control over logs and lumber.

The Timber Resources Management Regulations, 1998 (LI 1649) have specific provisions that criminalise chainsaw milling and operations for commercial purposes:

- “No person shall use a chainsaw, whether registered or unregistered, to convert timber into lumber or other forest products for sale, exchange or any commercial purpose” (s. 32, clause 1); and
- “No person shall sell or buy timber products which have been produced through chainsaw milling” (s. 32, clause 2).

By 2001, illegal chainsaw milling was becoming a real problem. In spite of being banned, it was gradually taking over as the major supplier of timber to the domestic market. This led to the formation of a Policy Advisory Committee at the Forestry Ministry. One of its recommendations was increased linkage and collaboration of chainsaw activities with other national initiatives such as the national Forest Plantation Development Program in order to provide alternative livelihoods for chainsaw operators. This brought the National Forest Plantation Development Centre (which implemented the program) into the chainsaw milling discussions.

In the face of the growing dominance of illegal CSM as the main supplier of timber to the domestic market, the FLEGT VPA process emerged and in 2008 Ghana signed the agreement with the EU. With the inclusion of the domestic market under FLEGT VPA, the government is forced to think about the dual objective of being able to meet the future domestic demand for legal timber and to maintain foreign exchange earnings from wood exports.



Chapter 3

Timber production and trade

3.1 Structure of chainsaw milling

An analysis of chainsaw operations (TBI-Ghana 2008) recognised 18 stakeholder groups, including the FSD, farmers, lumber brokers, sawmillers, DAs, consumers (including carpenters), law enforcement agencies (police, judiciary and Customs, Excise and Preventive Service, or CEPS), chiefs (land-owners) and chainsaw operators, including operators, loading boys and transporters. Other key stakeholders in policy discourse included the Ministry of Lands and Natural Resources, the Parliamentary Select Committee on Forests, environmental non-governmental organizations (ENGOS) and trade associations, including the Ghana Timber Millers Organization (GTMO) and the Ghana Timber Organization (GTA).

For the operatives (from the loading boys to the lumber dealers who finance the activity), CSM is a source of employment that supports their livelihood. At the community level, the operations affect local people, especially farmers, in both positive and negative ways. CSM supplies local people with lumber and some farmers sell trees on their farms for income; on the other hand, some people have conflicts with operators over payment of compensation for trees cut on their farms and for damages to their crops. The DAs and traditional authorities (land-owners) are important participants since chainsaw operations potentially affect their revenue from forest exploitation. There is a general perception that some chiefs support chainsaw operations and are sometimes involved in it.

The timber trade associations, particularly the GTMO, are opposed to CSM and have consistently called for full enforcement of the ban. The GTMO and GTA are umbrella organizations for Ghana's timber-milling companies and logging companies, respectively. With their secretariats headed by a full-time executive secretary, they have

legitimacy as organised trade bodies in the industry and wield substantial influence in the sector. They are represented on the Forestry Commission Board and are consulted on all major forest policy issues. CSM operators are not well organised at the moment and do not have access to official policy consultation forums.

There is evidence that chainsaw milling takes place in the concession areas of some licensed companies, depriving them of timber stock for their operations (Adam et al. 2007a). This creates conflicts and tension and in some cases results in physical assault. Acheampong and Marfo (2009) reported that chainsaw operators steal timber, especially in off-reserve areas, from concessions.

The Forest Services Division (FSD) is another stakeholder that is greatly affected by chainsaw operations. CSM increases the division's monitoring costs and complicates forest management planning since illegal operations distort inventory data. It is reported that some officers benefit economically from CSM (for details on official corruption, see Marfo in Tropenbos International 2004 and Adam et al. 2007b). The military and the police have often been called on to beef up the enforcement capability of the FSD. This sometimes takes the form of a task force, a joint policy/FSD/military team that patrols forest areas to arrest chainsaw operators. The judiciary, especially district courts, deal with prosecutions related to chainsaw milling offences and often participate in discussions about CSM.

Both national and international NGOs participate in CSM discussions. They have advocated against the status quo to arrest current indiscriminate harvesting practices. Some NGOs have become active in policy discourse, calling for the development of alternatives rather than sticking to enforcement as the only policy option. Some environmental NGOs have argued for full enforcement of the ban.

At the operational level, the main CSM participants are involved in the production, transport and marketing of chainsaw products and in the financing for these operations. They include operators, operational assistants, loading boys, drivers, wood dealers, resawyers and retailers. The operations mainly involve production (at the stump site in the forest or bush), loading to main roadsides, haulage to timber markets, resawing beams into tradable sizes (mostly at the timber markets) and retailing. Of these enterprises, 79% were classified as sole-proprietorships, 11% as partnerships involving several individuals, and 10% as having group ownership involving independent operating units (based on data provided in Adam et al. 2007a, 35).

The people involved in chainsaw operations come from a range of backgrounds. The majority of people in the case study of Adam et al. (2007a) were farmers (48%), unemployed youth (16%), previous timber company workers (7%) and traders (6%), as well as mechanics, masons and labourers. The study reported that about 58% of these people got into the business through their own initiative; the rest were trained through apprenticeships. Interestingly, Adam et al. (2007a) also observed that about 40% of these enterprises had started operating since the ban was enacted in 1998.

These enterprises are rarely organised in a trade body such as the GTMO and GTA because of the illegal nature of their operation; Adam et al. (2007a) observed that 80% of operators did not belong to a trade association.

Since CSM is a significant supplier of domestic lumber, carpenters, woodworkers, building companies and individuals who buy wood are all affected by chainsaw operations. Public radio discussions often express the sentiments of these people, especially carpenters, who argue that their livelihoods will be affected if they do not have a reliable supply of timber for their work. In 2004, the TIDD estimated that there were more than 40,000 carpenters in the country.

3.2 Regulatory context

Generally, chainsaw milling is prohibited by law; this affects discussions on access, tree ownership and trade of chainsawn products.

3.2.1 Scope of prohibition

With respect to the general application on prohibition, the Timber Resources Management Regulations, 1998 (as amended) (LI 1649) are the main applicable instruments. Regulation 32 prohibits the use of the chainsaw to convert timber into lumber or other forest products. The emphasis as far as this provision is concerned is on the words “for the purposes of selling, exchange or any commercial purpose.” There has been debate and a lack of clarity about the scope of the ban on CSM. In July 2008 an expert round-table under the EU-TBI chainsaw milling project was held in Ghana to discuss the legal scope of the ban in practice. The experts at the meeting felt that the meaning of the regulation was clear and that its ordinary meaning in context should be adopted; i.e., if the lumber is not meant for sale, exchange or for any commercial purpose, then CSM should be permitted. The source of the timber — whether from forest reserves, farms within forest reserves or community forests — is not relevant in the interpretation of the legislative instrument.

This suggests that if a person uses a registered chainsaw to convert timber into lumber and uses the lumber for a benefit that cannot be defined as a sale, exchange or commercial purpose, then the activity becomes legal. This answers the question asked most often as to whether a registered chainsaw can be used to convert lumber for household use. The answer is *yes* if the use does not violate regulation 32 of LI 1649 or any other relevant regulation.

3.2.2 Land ownership and chainsaw milling

The issues of land ownership and property rights, although very important in forest governance and management, have no bearing on the interpretation of regulation 32 of LI 1649. The experts at the round-table concluded that the law attaches great importance to the right of every individual to enjoy his or her property, but use in the case of timber trees is regulated by LI 1649.

Section 4 of the *Timber Resource Management Act 547, 1997* defines lands that are subject to timber rights:

- Timber rights may be granted under a timber utilization contract (TUC) in respect of a) lands previously subject to timber rights, which have expired and are suitable for reallocation; b) unallocated public or stool lands suitable for timber operations in timber production areas; and c) alienation holdings.
- No timber rights shall be granted in respect of a) land with forest plantations; b) land with timber grown or owned by any individual group; c) land subject to alienation holding; or d) lands with farms without the authorisation in writing of the individual, group or owner concerned.

Act 547 also exempts certain lands as not requiring a TUC. This means that a person does not need timber rights under a TUC before he or she can harvest timber from such lands. A TUC does not, however, give any rights whatsoever to use a chainsaw to convert timber to lumber for sale, exchange or commercial purpose.

3.2.3 Transporting chainsawn lumber

The legal position in Regulation 32 is supported by Regulation 24:

- No timber shall be transferred or moved from any forest area unless there is carried with it a timber conveyance certificate.
- No conveyance certificate shall be issued for any lumber produced by chainsaw.
- A timber conveyance certificate is issuable only by an officer of the Forestry Department not below the rank of a Senior Technical Officer and may only be issued on an application from the contractor.

Although the law seems to allow CSM with a registered chainsaw for household purposes, it does not allow this lumber to be transported unless it is accompanied by a conveyance certificate. To address the contradiction that the law completely prohibits the transportation of chainsawn lumber, even for household use, some District Managers of the Forestry Services have issued waybills to allow such lumber to be transported. The experts concluded that the issuance of any form of permits by District Managers to transport chainsawn lumber must be prohibited. Instead, the law as it stands must be amended if it is not to restrict the use of chainsawn lumber to the locality where the lumber is found. If it does make this restriction, then it must also determine the meaning and extent of "locality."

3.3 Chainsaw milling operations

3.3.1 Access to trees

The production of chainsawn lumber is carried out at stump sites. Various strategies are used to obtain trees to be milled. Among 50 chainsaw operators interviewed from eight forest districts, 86% said they scouted for trees on their own, 34% said they used community members to spot trees and 88% said they were sometimes

invited by people to cut trees on their land (Acheampong and Marfo 2009). Chainsaw operators in the case study also identified the category of people who engaged them to cut trees on a negotiated term (e.g. price of tree, number of boards to be supplied, etc.): farmers (60%), individual builders (28%), timber dealers (26%), carpenters (12%) and building contractors and chiefs (16%).

The observation that local people depend on operators to fell trees on their farms is not surprising; other studies have confirmed that local people did so, and that in some cases they even went to the extent of consulting forestry officials. Nutakor and Marfo (2009), for example, report that 20 district offices registered approximately 480 requests from community residents to fell trees on their farms (Nutakor and Marfo 2009; Table 4). It is unclear where these individuals were going to obtain the equipment to do the felling if they received permission but the obvious option was to contact chainsaw operators.

Table 4. People who approach FSD for permission to harvest trees on their farmlands

actors	% of total cases
chiefs	51
individuals	15
social groups/churches	15
district assemblies	11
assemblymen	4
lumber dealers with farms	4

Source: Nutakor and Marfo 2009; n = 480

Nutakor and Marfo (2009) also observed that 48% of chainsaw operators admitted that they almost always engaged community members in their operations and 46% said they sometimes did so. Only 6% said they had never used community members in their operations.

The surveys conducted by Adam et al. (2007a) and Acheampong and Marfo (2009) both observed that farmlands were the most important source of trees; 76 and 82% of operators, respectively, mentioned farms as the most important source, followed by fallow lands and forest reserves. Forest reserves did not feature as an important source in Adam et al. (2007a) although there is increasing evidence that chainsaw operations also occur in reserves (*Ghanaian Times* 2009 and Adam and Dua-Gyamfi 2009b). The two studies confirm that off-reserve areas are the prime sources of trees for chainsaw operations.

Many factors influence an operator's choice of trees and area of operation. Acheampong and Marfo (2009) asked why certain areas were important and Adam et al. (2007a) asked about which factors were considered important for selecting a tree to fell (Tables 5 and 6).

Table 5. Operators' reasons to consider areas their most important source of timber

reasons	proportion of answers from respondents obtaining timber mainly from:		
	forest reserves (n=6)	fallow areas (n=5)	farms (n=38)
availability of timber resources in the area	50	60	16
helps open up farms and helps crops to grow well	0	0	26
harvesting in the area does not destroy farm crops	0	40	3
less likely to be arrested	0	0	13
availability of high-quality timber	50	0	10
easy access to trees/timber	0	0	26
farmers invite operators to harvest from their land	0	0	3
the ban on reserves	0	0	3
total	100	100	100

Source: Adam et al. 2007a

Table 6. Key considerations of CSM operators in selecting areas and trees for milling

factors affecting choice of trees for felling	% of respondents
availability of desired species	32
size	68
location on farmland	29
bole quality (length or form)	46
off-reserve	7
proximity to road	5
accessibility in terms of terrain	11

Source: Adam et al. 2007a; n = 76 respondents

Generally, the size of the tree, quality of the bole and location on farmland appear to be the most important considerations when selecting a tree to harvest. Most operators (about 74% in the case of Acheampong and Marfo 2009) indicated that they operated within five km of the main roads.

With regard to obtaining permission to fell trees, 80% of operators reported that farmers were the most important persons to contact, followed by assembly representatives and forestry staff (8%); 12% of operators said they did not ask permission to cut trees. Interestingly, 85% of those who contacted farmers said they did so because "the farmer is the land-owner and can give access to the trees" (Box 2); the others said it was because "they don't need a permit and can easily bargain with the farmer" (Acheampong and Marfo 2009, 88).

Acheampong and Marfo (2009) also report on operators' perceptions of the availability of trees for their operations. As many as 92% of chainsaw operators admitted that access to trees had become difficult; they reported that the three most limiting factors were increased law enforcement (86%), restrictive tree tenure arrangements (44%) and the long distances to travel to obtain trees (40%).

BOX 2. TREE TENURE AND ACCESS TO TREES

Tree tenure arrangements in Ghana are complex; the right that a person has over a tree depends on whether it is planted or naturally growing, whether it is on communal/family land or rented land; whether the whole tree is needed or only part of it, and whether the end use is commercial or domestic.

The rights to all naturally-occurring trees are vested in the state, no matter where they occur, except for alienated lands, which are lands that have been given back to traditional owners.

All planted trees are owned by the planter.

Although community members can generally use parts of trees on communal lands for domestic needs, they cannot harvest the trees or products for commercial use.

Any harvesting of trees requires a permit from the Forestry Commission in the form of a Timber Utilisation Contract, Timber Utilisation Permit or Salvage Permit.

For a detailed review of forest tenure security in Ghana, see Agyeman 1994 and Marfo 2009.

3.3.2 Production operations

Adam et al. (2007a) identified four main categories of workers involved in milling operations: tree fellers, porters, tree scouts and loading boys. In general, the size of the operation gangs ranged from six to nine. With the exception of the tree feller and porters, who may be migrants, most of the workers were hired locally.

The chainsaw brand used most often is Stihl, and the average age of equipment was six years (Adam et al. 2007a). Safety did not seem to be a major consideration in chainsaw operations. Adam et al. (2007a) for example, observed that as many as 73% of operators did not use any safety device such as boots, ear and eye protection, cups, gloves and helmets, nor did they monitor tree-felling direction. About 46% of operators reported having had occupational accidents. In addition to the lack of safety measures, about one third of operators studied also indicated that they carried out their operations at night. There was no correlation between working period and incidence of accidents (Adam et al. 2007a, 42).

Based on the results shown in Table 7, it can be concluded that one chainsaw operation involving tree spotting, setting up, felling and sawing takes two days to process an average of 1.2 trees. This means that the transaction time involved in chainsaw operations is significant, given that the felling and milling of one tree takes about 7.4 hours, or about one working day (Owusu et al. 2009). Thus almost half of the total operational time is involved in travelling, spotting trees and setting up.

Table 7. Operational statistics, chainsaw milling

parameter	unit	data source
number of hours to process 1 tree (average 2.97 m ³)	7.4	Owusu et al. 2009
number of trees processed in a working month	12	Owusu et al. 2009
approximate number of operation days to process one tree (including set-up and travel time)	1.92	deductive
average number of operations per month	5	recalculated from Adam et al. 2007a

Adam et al. (2007a) defines a working period as the length of time taken to complete one supply contract. They indicated that about one to four trees may be removed in one working period, depending on the contract.

Obiri and Damnyag (2009a) reported that an average of three trees were felled in one operation, based on observations of 78 chainsaw gangs felling and processing 240 trees. In the absence of other empirical data to resolve the discrepancy between the two different results (1.2 vs 3 trees felled per operation), it will be assumed for the purpose of further calculations that one operation takes about two days to process two trees, or one day per tree.

Given the sharp seasonal variations in operations and outputs caused by fluctuations in climate and demand, the number of operations stated by operators as reported by Adam et al. (2007a) is open to question. For example, they report that between February and September 2005, chainsaw operations were lean, with an average monthly yield of four trees. This implies an average of two operations per month for the period. The period between October and January was reported as peak, with an average of 23 trees felled in a month. This gives an average of 11 operations per month in the peak period. The conservative aggregate annual average number of operations is therefore taken to be five operations per month.

Gangs are generally paid before the operation begins. Loading boys are hired less often than other workers because their services are required only when the operation processes enough lumber to fill a truck (Adam et al. 2007a). Table 8 notes the number of operations and amounts reported by workers, including drivers, based on CSM activities during a peak period.

Table 8. Peak period operations and earnings, production and transport workers

employee category	average number of operations/month	amount paid/operation (GHC)	expected monthly income (GHC)
feller/operator boy	10	52.7	527.0
porter	11	30.0	330.0
driver	8	118.0	944.0
spotter	7	30.6	214.2
loading boy	4	38.2	152.8

Source: Adam et al. 2007a, 55. Amounts changed from old cedis to GHC and recalculated as monthly income

Operations involving felling, milling and carriage to roadsides are generally hurried. In general, all workers fear being arrested by forestry officials or task forces. In cases where there has been no negotiation with the land-owner (chief or farmer), the operation is even swifter, as the workers need to evade any confrontations with him or her. It is reported that a significant number of operations occur at night and after the farming season, when farmers have returned home (Marfo 2004).

The FSD generally depends on tip-offs to follow up on chainsaw operations. FSD staff have very little capacity for monitoring activities in off-reserve areas unless a specific licensed logger is operating in a particular area. Some communities have their own task forces who monitor chainsaw operators. More recently, the FSD's formation of Community Forest Committees (CFCs) in some forest-adjacent communities has added to its enforcement capacity; there is evidence of the committees' contribution to monitoring CSM (Asare, pers. comm.).

In some cases, when chainsaw operators are arrested, negotiations are carried out and informal payments (bribes) are taken (Section 3.6.5). Cases where operators resist arrest and engage in physical combat with officials have also been reported (Owusu 2004).

3.3.3 Transporting chainsawn lumber

Movement of chainsawn lumber from stump sites to marketing centres is predominantly done by haulage trucks with a capacity of 20–35 m³ (Adam et al. 2007). Each trip engages between seven (Marfo and Acheampong 2009) and nine people (Adam et al. 2007a), including the driver, one or two driver mates and loading boys. This may also include some of the loading gang in the forest and some of the off-loading crew at the marketplace. Approximately the same number of people are involved in the secondary transport of lumber from the market to joinery shops and construction sites. Recently, less orthodox methods have been employed to convey lumber to the market centres, including concealing lumber in vehicles carrying goods such as food and charcoal.

Law enforcement on roadsides is widespread but ineffectual. If it were effective, it would make it practically impossible for chainsawn lumber to be transported from

remote rural areas to urban markets. Marfo (2004) has reported on the strategies of timber dealers to cope with law enforcement, including paying bribes to the police to allow passage and establishing a “business network” with some officers. Another strategy was the use of a lead car to alert the drivers of loaded trucks to imminent danger. One dealer said, “when it comes to transporting the bush cut, that is where the problem is; normally, you have to lead the loaded trucks with a private car to bring it to the market” (p.26). Marfo’s report (2004) quotes another informant: “The trick used by some policemen is that one, usually the senior among them, will instruct the others to arrest the vehicle and accompany it to the forestry or police station. The other(s) will then approach the driver trying to suggest that he should find “something” (apparently referring to money) for them to use it to beg the officer to allow them to go. Through this, negotiation ensues and depending on the value of the lumber and the negotiation skills of both, a deal is reached (p.27).”

Dealers and operators have effectively enrolled law enforcement agencies in their operations. This is the only way that chainsawn lumber can travel across regions and towns given the numerous police, CEPS and FC checkpoints on the roads.

3.4 Marketing chainsawn lumber

3.4.1 Domestic markets

Chainsawn lumber is sold in almost all the 138 district capitals in Ghana. The main markets are Anloga (Kumasi, Ashanti region), Ofankor and Musse (Accra), Techiman (Brong Ahafo), Kasoa (Central region) and Kokompe (Takoradi). The Ashanti and Brong Ahafo regions are the two key distribution centres (TIDD/FORIG 2009). Domestic markets are increasingly found along major roadsides as well. These markets are run by lumber brokers, who buy their stock (plywood and low-grade lumber) from both traditional sawmills and chainsawyers and sell it to consumers.

Most of the brokers and retailers in these markets operate as sole proprietors (79%, as observed by Adam et al. 2007a); the remainder are family businesses or some sort of partnership. The social network is an important part of the lumber retail business. For example, Adam et al. (2007a) report that about 53% of traders were introduced to the business by family members; only 28% started trading on their own initiative and 19% based their trade on a previous association with the timber business.

3.4.2 Stocks, sales and species

A wide range of survey data exists on the annual stocks traded by lumber retailers between 2005 and 2008 (Adam et al. 2007a; Marfo and Acheampong 2009, TIDD/FORIG 2009). TIDD/FORIG (2009) reported average sales of 38,750 m³ per month, involving 611 retailers. This gives average annual sales per retailer of 761 m³, an average 639 m³ (84%) of which is chainsawn lumber. Adam et al. 2007a and Marfo and Acheampong 2009 reported annual chainsawn lumber sales of 460 m³ and 391 m³, respectively. The aggregate mean of these reported annual average sales per retailer is 497 m³.

A total of 72 species was observed as being processed through chainsaw milling; they were processed into 112 product dimensions (TIDD/FORIG 2009). The ten most commonly traded species are wawa, dahoma, ofram, ceiba, mahogany, esa, kyenkyen, emire, watapuo and nyamedua (TIDD/FORIG 2009; Annex 2). Adam and Dua-Gyamfi (2009a) observed that 78% of chainsawn lumber stock in studied markets consisted of wawa, dahoma, ofram and mahogany. Adam et al. (2007a) also observed that wawa was the dominant species milled by about 68% of the operators they studied.¹

About 84% of lumber in the markets studied was supplied by chainsaw operators; 16% came from sawmills (Marfo, Adam and Obiri 2009 and TIDD/FORIG 2009). The pattern was different with bench sawmillers; about 53% got their supplies of boards from chainsaw millers and 47% obtained their supply from sawmills (Adam and Dua Gyamfi 2009a). They also reported that the supply of boards to furniture and joinery shops was sourced almost equally from chainsaw millers (37%), sawmills (31%) and lumber retailers (29.5%). Marfo, Adam and Obiri (2009) observed that it was not entirely accurate to suggest that sawmillers had failed to supply timber products; the issue has often been the quality of timber, as most sawmill supplies are so-called "rejects."

Law enforcement, such as inspection of stocked lumber at the marketplace to establish its source, is not a common practice, except in cases where the FSD or military task forces follow vehicles suspected of containing chainsawn lumber to the market. The general notion in official circles is that monitoring should occur in the forest areas and on the highways, not in timber markets.

3.4.3 Consumers of chainsaw products in the domestic market

Table 9 summarises the results of two recent surveys that asked traders to rank their most important consumers. Both studies showed that carpenters, individuals and building contractors were the most important consumers of chainsawn lumber products. The government also buys chainsawn lumber, in spite of the fact that it is illegal.

Table 9. Consumers of wood products (%) in the domestic market

	Adam and Dua-Gyamfi 2009a	TIDD/FORIG 2009
carpenters	33	87
individuals	41	63
building/real-estate contractors	42	58
government institutions	8	8
middlemen/exporters	0	11

Note: Percentages as indicated by wood dealers; Adam and Dua-Gyamfi interviewed 360 retailers; TIDD/FORIG interviewed 600. Multiple responses were observed, which is why the total exceeds 100%

It is not clear why the proportion of carpenters differed so much in the two studies. The TIDD/FORIG study was nationwide and may give a more representative picture.

3.4.4 Prices

The price of chainsawn lumber depends on species, market location and product type (Adam et al. 2007a; Adam and Dua-Gyamfi 2009a and TIDD/FORIG 2009). Chainsawn lumber prices vary much more than those of sawmilled lumber, which are relatively stable. The prices quoted by Adam and Dua-Gyamfi (2009a; see Table 10) and Obiri and Damnyag (2009), who reported a mean price variance of 45%, suggest that chainsawn lumber is 12–74% cheaper than sawmilled lumber of the same species and dimensions.

Table 10. Price comparison, selected chainsaw and sawmill products in the local market

species	dimension (inches)	mean price (GHC)		cost of chainsawn lumber as % of sawmilled lumber
		chainsawn	sawmilled	
wawa scantlings	2x4x14	2.63	5.00	53
wawa board	2x12x14	4.67	16.00	29
ofram board	2x12x14	5.47	21.00	26
mahogany scantling	2x4x14	4.50	11.02	41
mahogany board	2x12x14	8.33	20.00	42
esia scantling	2x4x14	3.33	4.25	78
esia board	2x12x14	4.00	6.30	63
danta scantling	2x4x14	4.55	6.40	71
dahoma scantling	2x4x14	4.10	6.00	68
dahoma board	2x12x14	6.33	21.00	30
celtis scantling	2x4x14	5.42	3.50	155
overall mean				60

Source: Adam and Dua-Gyamfi 2009a

3.5 Chainsaw milling harvesting and production estimates

3.5.1 Timber harvest and production through chainsaw operations

Due to its nature, it is difficult to determine the extent of illegal lumber production in Ghana. Since 1999, several attempts have been made to estimate the domestic demand for timber and the contribution to this demand by illegal chainsaw operations (Birikorang et al. 2001; Coleman 2004, TIDD 2005; Marfo, Adam and Obiri 2009 and TIDD/FORIG 2009).

Two of these studies estimated the annual volume of trees harvested by chainsaw operators and elaborated the methodologies. Birikorang et al. (2001) used market survey data to estimate the annual harvest at 1.7 million m³; Hansen et al. (2008) argue that this is a conservative estimate for the period 1999–2005. Marfo, Adam and Obiri (2009) used the estimated number of chainsaw operators and their annual production figures to calculate the annual harvest at 2.4 million m³. Based on a critical assessment of the available information from those studies, and new information from a recent market survey (TIDD/FORIG 2009), a revised estimate is provided in the following sections.

These estimates of the annual harvest by chainsaw operators incorporate, and depend on, two main parameters which are both problematic in their measurement:

- the estimated average conversion efficiency of logs into lumber by chainsaw operators (section 3.5.2); and
- the total volume of chainsawn lumber supplied to the domestic market, plus lumber exported overland (section 3.5.3).

3.5.2 Conversion efficiency

Conversion efficiency data are highly variable, as they depend on a large number of factors, including the skill of the operator, the product to be cut, defects in the tree, size and shape of the log, species-specific differences in processing characteristics, and the basis used to calculate volumes and conversion factors. Processing Efficiency (PE) refers to the rate of recovery based on the volume of the log processed. Conversion efficiency (CE) is based on the volume of the whole tree. In order to reconcile the discrepancies in efficiency data between studies, recovery efficiency should be measured by the total volume of lumber recovered from the total usable volume of the tree; i.e., by conversion efficiency.

Reported conversion efficiencies for CSM cited in the literature range from 27–40% (Table 11), with an average of 30.3%.²

Table 11. Reported conversion efficiencies (means and range) of chainsaw operations

source	processing efficiency (%)	conversion efficiency (%)
Birikorang et al. 2001	*39	27
Frimpong-Mensah 2004	40 (22–51)	** 28 (15–36)
Gyimah and Adu-Gyamfi 2009	51	** 36
Owusu et al. 2009	43 (32–57)	** 30 (22–40)
average ± standard deviation	43.1 ± 5.6	30.3 ± 4.0

* reported estimate of 27% multiplied by 1.43 to account for 70% log recovery rate

** multiplied by the 70% rate of log recovery (Owusu et al. 2009) where butt and top end residues were not included in the conversion efficiency estimate

3.5.3 Consumption of chainsawn lumber by the domestic market

Determining the actual consumption of chainsawn lumber within Ghana requires an estimate of chainsawn lumber production and of the amount of chainsawn lumber exported to neighbouring countries. A recent national survey conducted by TIDD and FORIG (TIDD/FORIG 2009) projected the annual sales of timber (lumber and plywood) in the local markets to be 664,350 m³, 84% of which (558,054 m³)³ was reported to be sourced from chainsawn lumber.

To estimate total CSM production, the illegal direct overland exports of lumber must be added. Based on data by Blackett and Gardette (2008),⁴ total overland exports can conservatively be put at 260,000 m³ per year (Table 12), all of which is assumed to be derived from CSM.

Table 12. Timber and wood products trade to regional markets in West Africa, 2007

to	product	volume	status
Benin	plywood	2,500 m ³	legal
	lumber	unknown	illegal
in transit to Sahel	teak sawn-timber	unknown	illegal
Ivory Coast	lumber	unknown	illegal
Nigeria	plywood	74,500 m ³	legal
	lumber	unknown	illegal
Sahel region	lumber	39,000 m ³	legal
	lumber	260,000 m ³	illegal
Togo	plywood	6,700 m ³	legal
	lumber	unknown	illegal

Source: Blackett and Gardette 2008

The TIDD/FORIG survey (TIDD/FORIG 2009) indicated that 11% of the lumber sales of 664,350 m³ in the domestic market — about 72,904 m³ — were exported overland. If 84% of this volume derived from CSM, then the direct overland exports can be set at 199,000 m³. It is unlikely that direct sawmill sales are included in this total, as sawmills would have the appropriate permits and licences and would export lumber legally.

Table 13 presents a range of estimates of the tree volume harvested by chainsaw millers, based on reported recovery efficiency, domestic annual sales volume and direct overland export volume.

Table 13. Estimated roundwood equivalent of lumber processed by chainsaw operators

		total volume (m ³)	% CSM	volume derived from CSM (m ³)	comment
a	annual sales at local markets	664,350	84	558,054	TIDD/FORIG 2009
b	exported through the market	72,904	84	61,239	TIDD/FORIG 2009
c	direct exports	198,761	100	198,761	Blackett and Gardette 2008
d	local consumption	591,446	84	496,815	cf TIDD/FORIG 2009 and Blackett and Gardette 2008 (a–b)
	total CSM production (lumber)			756,815	this study (c+d)
	volume (RWE) harvested by chainsaw operators			2.5 million (2.2–2.9 million)	based on 30.3% conversion efficiency ± 95% confidence interval

Thus, the annual harvest of trees by chainsaw operators can be taken to range from 2.2 to 2.9 million m³; given an average tree volume of 2.97 m³, this is equivalent to about 745,000 to 970,000 trees.⁵ If non-market volumes consumed through direct consumption by households for building, roofing, etc. were included, the estimate would be higher. This new estimate is higher than previously published calculations of CSM production in Ghana (Table 14).

Table 14. Published estimates of CSM production in Ghana

source	year	volume (production)	volume (processed)
Coleman 2004; FC data	1995	n/a	190,000
Birikorang et al. 2001	1999	1,700,000	460,000
Odoom 2004 quoting TIDD 2003	2003	n/a	273,000
Marfo et al. 2009	2007	2,400,000	728,981
this study	2009	2,500,000	756,815

Keeping in mind that a determination of harvest levels requires further studies, it is realistic to use a range of 2.2–2.9 million m³ for policy discussions. Even using this lower range means that the harvested volume could be more than the official AAC of 2 million m³, suggesting that CSM contributes substantially to Ghana's forest loss. This estimate is far higher than the annual average volume of unaccounted harvesting by licensed loggers in off-reserves, estimated to be 767,104 m³ (Affum-Baffoe 2009).

The production and consumption figures for the domestic market and overland export are summarised in Table 15.

Table 15. Annual production of timber (m³) for domestic, overland and overseas markets

	formal production	chainsaw milling
on reserve (1,678,800 ha)	^a 800,000 (1999) ^a 550,000 (2004)	no data
off-reserve (6,547,100 ha)	^a 900,000 (1996) ^a 300,000 (2005)	
Annual Allowable Cut (AAC)	2,000,000	0
total production (roundwood equivalents)	^a 2,000,000 (1996–2001) ^a 1,600,000 (2005)	^e 2,200,000–2,900,000
domestic consumption (lumber)	^b 92,000 (2003–04) ^c 95,000 (2009)	^c 497,000
overland export (lumber)	no data	^f 260,000
overseas export (lumber)	^d 528,570	no data

Sources: a) Hansen and Treue 2008; b) Parren et al. 2007; c) TIDD/FORIG 2009; d) TIDD report 2008; e) this study; f) Blackett and Gardette 2008

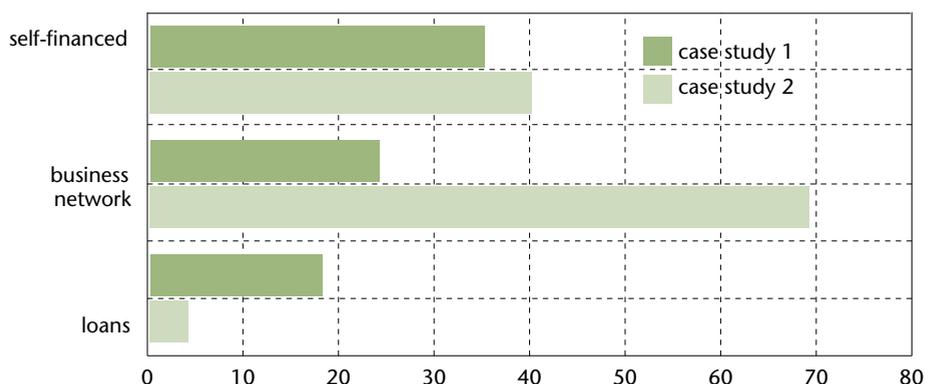
3.6 Financing, costs and benefits of operations

3.6.1 Investment

Although chainsaw operations require relatively little capital input, the cost of equipment and operations needs to be paid. Many operators depend on support from outsiders to finance their operations.

Figure 1 compares the sources of financing of chainsaw operations in two case studies. Reinvestment from sales (self-financing) and from the business community, including mainly timber dealers, are prominent in financing for CSM. A similar pattern was observed in sources of start-up capital reported by Adam et al. (2007a). On average, 62% of operators obtained capital from their business network, 25% from personal sources and 13% from loans.

Lumber dealers obtain their stock in diverse ways. Some of them provide funds to operators to produce the lumber for them at a much lower cost than the market price; other brokers acquire a chainsaw and hire the operators to produce the lumber for them. What is also becoming apparent is that some of these brokers obtain chainsaw beams/lumber from the stump site and send them to small sawmills in the area for reprocessing into lumber to avoid detection by the police and customs officers at checkpoints (Damnyag and Obiri 2009). According to informants, most of the reprocessed lumber from these sawmills is sent to the larger timber markets for sale and for export because the necessary documentation could usually be provided only by the sawmillers.

Figure 1. Comparison of operators' sources of financing for their operations

Source: case study 1, Obiri and Damnyag 2009a (n = 119); case study 2, Adam et al. 2007a (n = 76); multiple responses observed in both cases

3.6.2 Production costs

Production costs for chainsaw operations include labour, variable costs and transaction costs. Variable costs include the repair and maintenance of chainsaws, accessories, petrol and engine oil and miscellaneous items. Transaction costs involve payments for trees to farmers, forestry officials, bribes to law enforcement agencies (task forces, police), payments at community checkpoints, compensation to farmers for crop destruction and alcoholic drinks for chiefs. Reported costs varied from study to study (Table 16).

Table 16. Production costs and net revenue, two case studies

	case study 1		case study 2		
	*GHC/operation	% of production cost	GHC/operation	GHC/m ³	% of production cost
labour	98	25	625	192.71	44
variable cost	**299		565	174.21	40
transaction cost		75	215	66.29	15
total cost	397		1,405	433.21	
gross revenue	485		1,621	499.81	
profit	88	22	216	66.60	15

Source: case study 1 (Adam et al. 2007a); n = 35; case study 2 (Damnyag and Obiri 2009b); n = 89

*scope of operation (volume of trees) is not clear; **variable cost computed as part of transaction cost

Generally, labour costs involved payments to chainsaw operators, carriers/porters, spotters and loading boys. Damnyag and Obiri (2009) reported that the various cost components did not vary much across the eight districts they studied (case 2). Labour costs in the two studies varied substantially, however, ranging between 25

and 44% of total production cost. It is difficult to compare the proportions of variable and transaction costs across the cases because the scope of operation is not clear in the first case study.

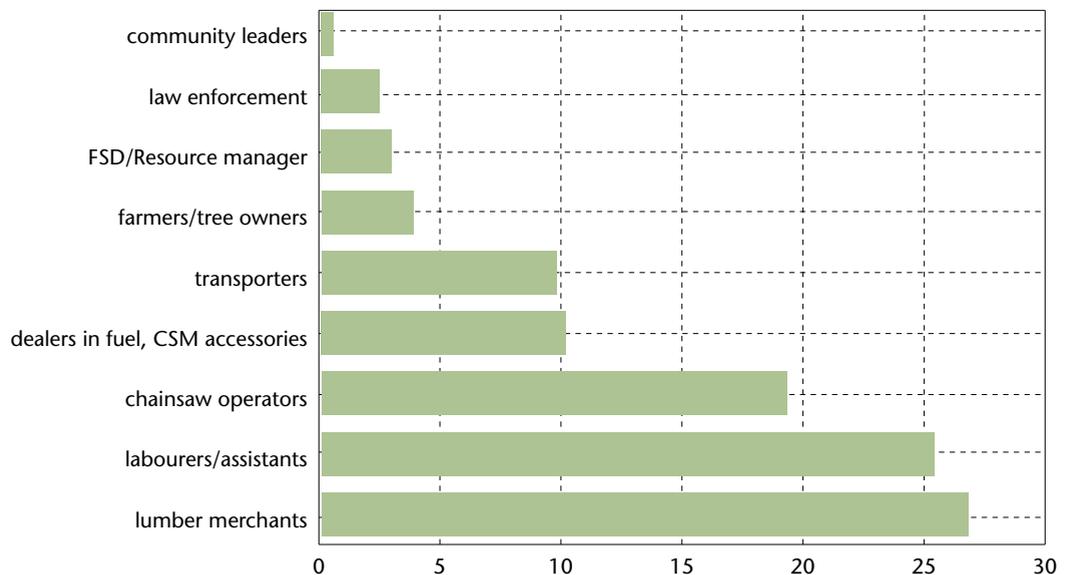
3.6.3 Profitability

There is a common impression that CSM is very profitable because no stumpage fees or taxes are paid. The cost and revenue calculation in Table 16 suggests a profit (net revenue) range of 15–22% of production cost. Some case studies report losses; for example, Damnyag and Obiri (2009b) reported negative net revenue ranging from GHC 36–93 per m³ in some districts. This variability in cost and profit could be expected; operations are not very standardised in terms of transaction costs, which mostly involve bribes and other illegal payments that are negotiated between dealers and communities and law enforcement agencies. Moreover, prices, and therefore gross revenue, are largely determined by dealers, who buy from the forest gate or at the timber markets. Based on an average profit of GHC 66.6/m³, the total annual profit from sales of 558,000 m³ of chainsaw lumber is about GHC 37 million.

3.6.4 Revenue distribution

Figure 2 shows the distribution of gross revenue to the members of the chainsawn lumber product chain in a study of eight forest districts (Obiri and Damnyag 2009a). It should be noted that the number of recipients in each category varies between 1 and about 20, resulting in different per capita revenues; the average gross revenue was GHC 499.81/m³. With total sales of 558,000 m³ of chainsaw lumber, total annual gross revenue can be estimated to be about GHC 279 million.

Figure 2. Chainsaw revenue distribution (%), single operation in eight study districts



Source: Obiri and Damnyag 2009a; study of eight forest districts

As shown in Figure 2, the transporter receives approximately 10% of gross revenue and suppliers of the machine, fuel and accessories also receive approximately 10%. The operator receives 19% of the gross revenue; his or her labourers and production assistants, providing various services, earn 25% (e.g., if the operation hired six assistants, each of them would receive about 4%). The lumber merchant receives the highest proportion of revenue from chainsawn lumber (27%). The margin between the operator and lumber merchant's income is about 8%. As tends to be the case in many commodity chains, the sellers at the end of the chain make the most money.

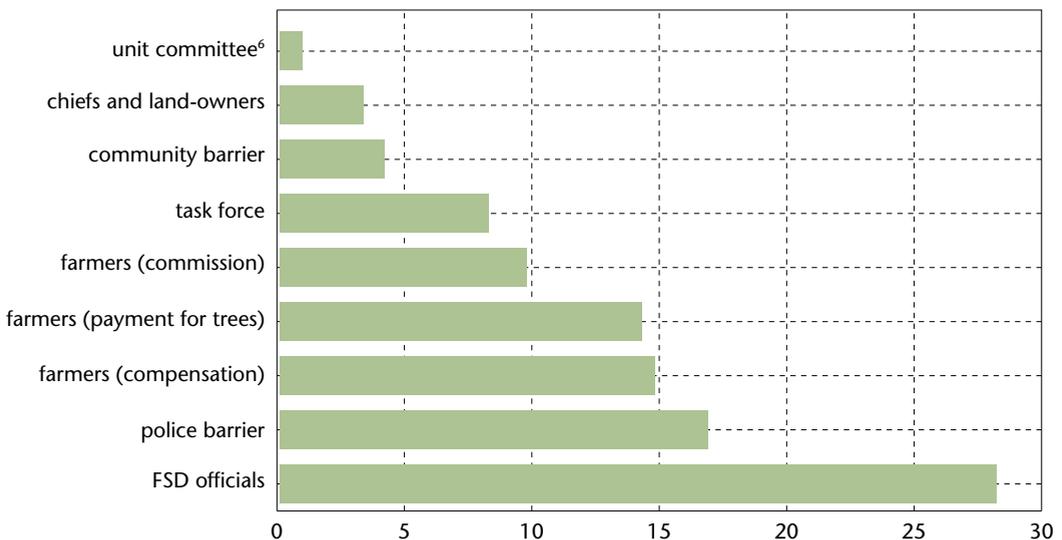
With operators obtaining about 19% of gross revenue per unit volume, and annual sales of 558,000 m³ of chainsaw lumber, the total annual gross revenue they retain is estimated at about GHC 52 million.

3.6.5 Informal payments

Even though chainsaw operators do not pay stumpage or other fees as licensed loggers do, the production and transportation of chainsawn lumber involves substantial informal payments to a wide range of people. Obiri and Damnyag (2009b) report a total informal payment of GHC 60.16 to produce and sell one cubic metre of lumber, based on a study of 120 operators. The recipients of this payment and the approximate proportions they obtained are shown in Figure 3.

Figure 3 shows that at least 50% of informal payments go to public agencies (FSD, police and task force) directly involved in enforcing the ban. About 38% goes to farmers to cover the cost of trees, commissions and compensations for damages. The land-owners (chief and communities), who collectively gain about 14%, benefit least from the payments.

Figure 3. Informal payments (%) per single operation in eight study districts



Source: modified from Obiri and Damnyag 2009a; n = 120

It is difficult to compare the distribution of informal payments between CSM and conventional sawmills because data on the latter is limited. It might be useful to study how informal payments are made and distributed by licensed loggers.

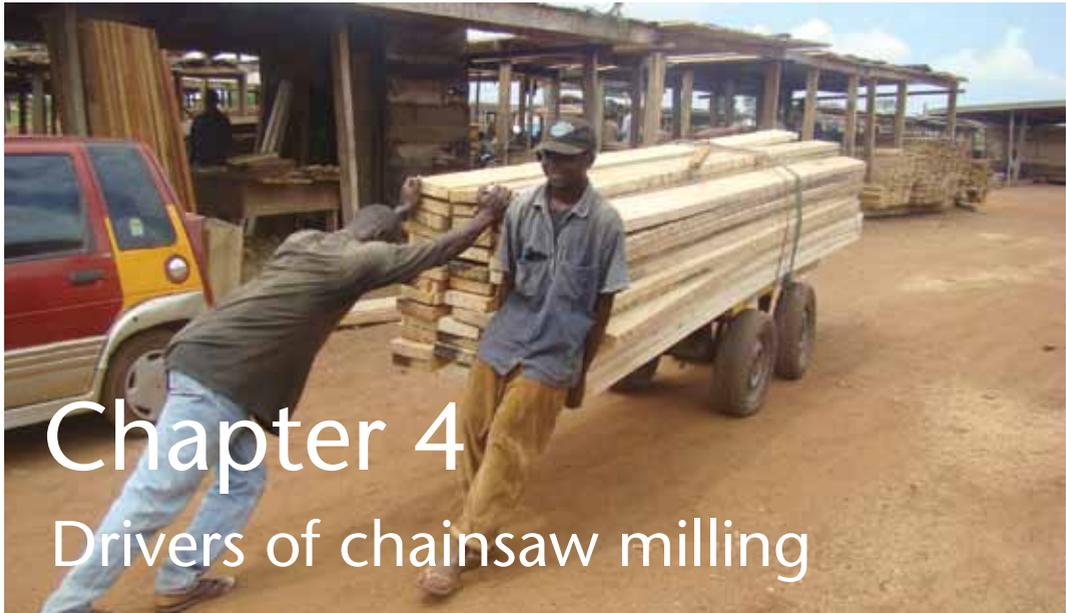
Acheampong and Marfo (2009) report some evidence to suggest that chainsaw operators would be willing to pay for trees under a regularised regime. Although all the operators agreed to pay for trees, they differed in the method: about half wanted to pay tax on timber; about one-third wanted to pay monthly permit fees; and one-tenth wanted to pay income tax on profits (Table 17).

The summary data in Table 17 suggest that the average price that operators are willing to pay for high-quality timber compares favourably with the stumpage fee currently paid by licensed loggers.

Table 17. Operators' willingness to pay (GHC) for trees

quality of tree	minimum	maximum	average	relation to stumpage
high	5	300	33.9	6% more
medium	4	150	17.7	65% less
low	2	50	9.4	69% less

Source: Acheampong and Marfo (2009); note: stumpage is GHC 10.5/m³, or c. GHC 31.5/tree



Chainsaw milling has persisted, even in the last decade or so when it was banned. Extensive discussions have taken place about how to deal with CSM in policy and practice. In order to be able to design adequate policy responses, it is necessary to know the key factors that drive chainsaw milling.

Several reviews of the chainsaw ban have shown that enforcement of the ban has not been effective. Birikorang et al. (2001) estimated that in 1999, the year after the ban was proclaimed, about 1.7 million m³ of wood was illegally harvested by chainsaw operators.

Chainsaw offences are pervasive. Adam et al. (2007b) report that, in 2005 alone, 94% of forest offences in eight forest districts were related to chainsaw operations. Marfo and Nutakor (2009) confirm this and report that about 70% of forest districts recorded 31–45 cases of chainsaw offences in 2008 alone. A national survey revealed that an average of two chainsaw offences are reported to Forest District offices each week. Between January and July 2003, a total of about 500 trucks carrying illegal chainsawn lumber were impounded by a single regional forestry office (Tropenbos International 2004).

4.1 Why does chainsaw milling exist?

4.1.1 Lack of adequate policy response to domestic timber demand

The formal forest sector has largely focused on the export market and neglected the domestic market. It was often assumed that no specific measures would be needed to ensure that the domestic demand was met. This was not the case, however, and chainsawn lumber has largely filled the gap in supply. In a recent national survey,

TIDD/FORIG (2009) reported that an average of 84% of the total wood stocked in timber markets across the country was supplied by chainsaw operations (so-called “bush cut”).

The 1994 Forest and Wildlife Policy has a clear objective to promote the development of viable and efficient forest-based industries so as to fully utilise timber and other products from forest resources to satisfy domestic and international demand for competitively-priced quality products (1994 Policy, objective 2). At the time the ban was enacted, the annual domestic demand for lumber was estimated to be 450,000 m³ (TIDD 2005). When it became apparent that the formal sector was not willing or able to supply the domestic market, the policy created two specific instruments to achieve this objective:

- special timber utilisation permits (TUPs) to 78 selected small- to medium-scale sawmills to produce lumber exclusively for the domestic market; and
- a directive in accordance with section 36 of LI 1649 that all holders of Timber Utilisation Contracts (TUCs) were to supply 20% of their lumber to the domestic market.

In practice, these instruments have largely failed (TIDD 2005; Parren et al. 2007). According to the TIDD (2005) assessment, the dedicated sawmills could not adequately supply domestic markets because their concessions did not have enough quantities of the desired species; in addition, there was “illegal” export of products to markets that offered higher prices than the domestic market. The supply gap persisted and continued to be filled by chainsawn lumber. Although communities had access to timber as guaranteed by LI 1649 through timber utilisation permits (TUPs), this system was abused and the permits were given mainly to commercial timber interests (Parren et al. 2007; Davies and Awudi 2001).

The process to obtain a commercial harvesting permit (Timber Utilisation Contract) is cumbersome and competitive and the industry — supported by politicians — has largely succeeded in pressuring the Forestry Commission to circumvent the law and grant it TUPs instead.⁷

The GTMO has argued that it has met the 20% requirement for domestic lumber as the directive did not specify products or quality levels.⁸ This was in response to complaints that the products supplied by sawmills were of lower quality (off-cuts) and did not meet general consumer standards, especially for construction. This claim has often been rejected by lumber dealers in meetings; they say that even before the directive came to force, sawmillers supplied the local market with products that were not export grade. Forestry officials argue that the intent of the directive was to require sawmillers to supply export-grade timber. Sawmillers say they are not able to meet the 20% requirement because they cannot make a profit if they sell export-grade timber at prevailing domestic prices.

If the patterns of supply from sawmills since the ban are studied, it can be concluded that the policy response was not adequate in addressing domestic lumber needs.

from legal sources. Parren et al. (2007) recently reviewed the domestic market situation, with an emphasis on off-reserve forest timber production:

- As of 2001, 20% of production from an industry with a primary recovery efficiency of 50% at best would equal 150,000 m³ (based on the AAC, then 1.5 million m³). This supply was inadequate to address the domestic demand, then estimated at about 450,000 m³, leaving a shortfall of 300,000 m³.
- During 2003 and 2004, sawmills supplied 92,000 m³ of lumber to the domestic market. This was only one fifth of the estimated domestic demand.

The TIDD/FORIG study (2009) recorded a 16% share of sawmilled lumber in domestic markets, or 95,000 m³ of an estimated domestic demand of 591,000 m³ (Table 15).

It can be argued that the policies on chainsaw milling and domestic timber supply have been inconsistently implemented. Furthermore, the policy to supply 20% of industrial sawnwood to the domestic market seriously underestimated the demand. The directive is unrealistic; only 200,000 m³ of sawnwood could be legally supplied by the industry even if all the two million m³ AAC were used and this would still be less than the domestic demand. Moreover, the use of TUPs — which were intended to give legal access to timber to communities, rather than to commercial interests — acted as an indirect official encouragement of CSM, since it was the only alternative source of lumber. Allowing timber markets to sell illegal products when a regulation is in place that bans these products meant that practice clearly conflicted with sector policy.

In addition, the ban is inconsistent with the provision in the 1994 Forest and Wildlife policy on employment and local peoples' right of access to timber for their daily needs. It seems illogical to ban an activity that economically engages people when there is a clear sector policy commitment to employment creation.

4.1.2 Access to and affordability of chainsawn lumber

Over the years, chainsaw milling has persisted because it provides easy access to timber in rural areas, where about 70% of Ghana's population live. The majority of sawmills are located far from rural areas, however, in urban areas within the high forest zone. They are mainly concentrated around Kumasi, Takoradi and Sunyani.⁹

The transaction cost of obtaining sawmilled timber in rural areas is high, mainly due to time and transportation costs. The only alternative for most rural people is chainsawn lumber. Chainsawn lumber has consistently been a cheaper source of timber; the price difference between chainsawn and sawmilled lumber has often been significant. Both stakeholder perceptions and recent survey data (Table 10) support the observation that chainsawn lumber is far less expensive than sawmilled lumber. Obiri and Damnyag (2009a) report that as many as 98% of stakeholders interviewed thought that chainsawn lumber was cheaper.

4.1.3 Tenure and inequitable benefit sharing

Chainsaws were introduced in Ghana at about the same time that significant tree tenure reform was undertaken through the *Concessions Act* of 1962. The Act vested ownership of all trees, irrespective of where they grew, in the President in trust for the people. Since then, a farmer's prerogative to give logging rights to other parties has not been recognised (Amanor 1999), even though farmers exercise control over decisions on which trees to cut during farming. Thus, over the years, it was easier for farmers to cooperate with chainsaw operators who wanted to mill trees on their farms; this also provided the household's timber.

This situation was exacerbated by the fact that farmers were cut off from any benefit-sharing arrangement from the exploitation of trees on their farms (Box 3). This arrangement is informed by a complex land and tree tenure system that recognises only traditional authorities (chiefs) and local government authorities (District Assemblies) as legitimate receivers of forest revenue, ostensibly to benefit their entire communities. Several studies have concluded that these authorities have not been accountable in this regard (Marfo 2004; Opoku 2006; Ayine 2008; Hansen and Treue 2009).

BOX 3. BENEFIT-SHARING AND TIMBER REVENUE

Article 267 of the 1992 Constitution of Ghana stipulates a formula for sharing forest revenue. The Administrator of Stool Lands is intended to take 10% of the total revenue received and share the remainder as follows:

- 25% to the stool in keeping with its status;
- 20% to the Traditional Authority; and
- 55% to the District Assembly (Ghana Forestry Commission 2009).

In practice, the Forestry Commission takes about 50% to cover its management costs and gives the remaining 50% to the administrator to be shared according to the formula.

4.1.4 Unemployment

Another underlying factor that drives chainsaw operations is the lack of employment opportunities for rural youth. The demand for chainsawn lumber in the rural forested areas has provided economic opportunities for young people who are unemployed or who want to supplement livelihood activities such as farming.

4.2 Why has chainsaw milling persisted in spite of the ban?

4.2.1 Unclear legal framework

At a national expert consultation meeting in 2004 (Tropenbos International 2004) there was widespread agreement that enforcement of the ban had been compromised because its legal framework supported multiple interpretations. Stakeholders observed that enforcement efforts have found it difficult to interpret the law and apply it to specific cases. Three major issues are at stake:

- Does the ban apply to trees harvested with registered chainsaws for non-commercial use?
- Does the ban apply to trees located outside forest reserves?
- Does the ban prohibit the transportation of chainsawn lumber?

These questions have complicated the enforcement of the ban since individual situations are left to official discretion. At the national round-table meeting on legal analysis of the chainsaw ban, it was suggested that these questions would be answered by a legal review of the law from a competent court of jurisdiction. In the absence of that review, Marfo and Azu (2009) reported an interpretation offered by a national expert round-table meeting (Section 3.2).¹⁰

4.2.2 Corruption and weak institutional governance

Corrupt practices and ineffective law enforcement have facilitated illegal chainsaw milling (Marfo 2004; Odoom 2005; Adam et al. 2007b). There is overwhelming evidence that corruption is prevalent among the frontline staff of the law enforcement agencies and forest service. As many as 85% of chainsaw offences reported to district forest offices are in turn reported to the police, but only 55% are prosecuted. Adam et al. (2007b) reported that in some districts, few cases were brought to court even though they observed evidence of offences at the forest office. In addition, enforcing the chainsaw ban through the courts involves huge costs to forestry officials. Adam et al. (2007b) reported that some cases were treated contrary to regulations; this is a disincentive for both the police and forest officials to pursue prosecution.

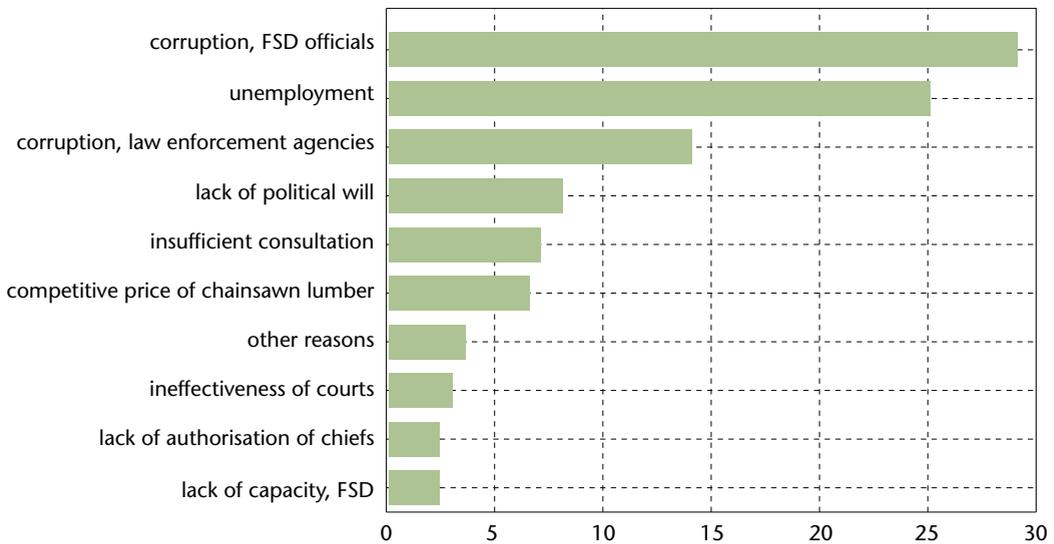
4.2.3 Political interference and lack of political will

Political interference is a significant driving force behind chainsaw milling in Ghana (Tropenbos International 2004; Adam et al. 2007b). Political interference limits the capacity of officials to fully enforce the law. In at least half of the reported cases of chainsaw offences, District Managers admitted that they had experienced external pressure. Most of the parties who intervened were chiefs (70%); the others were District Chief Executives and assembly representatives (Marfo and Nutakor 2009).

4.2.4 Other factors

Other factors, based on stakeholder perceptions, also drive CSM (Figure 4). In addition, the coping strategies adopted by operators make it difficult to arrest them. Narrative reports in Nutakor and Marfo (2009) indicate that many CSM operators work at night, making it dangerous for community members to confront them. In some instances, even though local people know who the operators are within the community, forestry officials and the police are said to tacitly refuse to use information from community members.¹¹ Some local people said that this frustrated their efforts to protect the resources in their forests (Nutakor and Marfo 2009). For this and many other reasons, cited for instance by Odoom (2005), farmers and communities find no incentive to cooperate with the FC and in fact connive with the illegal loggers to benefit from a share of the resource.

Figure 4. Stakeholders' perception of the main reason for ineffective ban enforcement



Source: Marfo and Nutakor 2009; n = 308



Chapter 5

Social, economic and environmental impacts

5.1 Social impact

5.1.1 Employment

Due to the illegal nature of chainsaw milling and the large number of different individuals involved in the product chain, it has been difficult to obtain accurate estimates for the number of people employed in CSM. Several studies have estimated the number of people engaged in chainsaw activities (Table 18).

Table 18. Estimates of number of jobs provided by CSM

study	year of estimate	estimated number	remark
Birikorang et al. 2001	1999	900	did not include all people involved in stump site operation or retailing of products
Odoom 2005	2003	50,000	methodology not elaborated
Adam et al. 2007a	2005	80,000	methodology based on estimated volume of illegal harvest; captured entire production-market chain
Marfo and Acheampong 2009	2007	94,000	validation of parameters used in Adam et al. 2007a; captured entire production-market chain

Determinations of the employment generated by CSM depend on CSM production estimates, the number of people involved in each stage of the chain, and their productivity.

Based on recent market surveys (TIDD/FORIG 2009) on annual sales of chainsawn lumber traded in the market, direct overland exports (Table 13) and other factors, it is estimated that the actual number of people participating, on a full-time equivalence basis, in production, hauling, resawing and retailing in the domestic market alone could be more than 75,000 (Table 19 and Annex 1).

Table 19. Estimated number of direct jobs (full-time equivalents) created by CSM

phase in the product chain	estimated employment (full-time equivalents)	total number of people involved in CSM*
stump site	42,049	63,074
haulage	2,082	3,123
resawing	27,197	27,197
retailing	3,930	3,930
total	75,258	97,324

*Number of full-time and part-time jobs created by CSM, assuming half of the workers are involved on a part-time basis (50%)

These calculations assume that workers are involved full time in the chainsaw enterprise. Obiri and Damnyag (2009b) reported that about half of those involved in chainsaw activities in the communities earn their main income from CSM. Table 19 also lists the total number of jobs in the production and haulage sectors, taking the assumption of 50% part-time involvement into account.

In addition to the estimated 97,000 people involved in the production and marketing of chainsaw products, many other people indirectly derive income from services at the timber markets or depend on chainsawn wood for their work. In 2005, for example, the Timber Industry Development Division (TIDD) estimated the number of small-scale carpenters in Ghana at about 41,000 (Adam and Dua-Gyamfi 2009b). These carpenters and joinery firms produce household and office furniture, panel doors, door and window frames, pallets, fruit crates, caskets, cabinets and other products, and they account for about 75% of the consumption of sawn timber in Ghana (Coleman 2004). Thus, chainsaw operations provide direct and indirect jobs for about 138,000 people. This is more than 3% of the country's work force of 4.1 million, based on population estimates for the year 2000.¹²

The sector is also significant in relation to household dependency. Based on the 2000 average household size of 5.1, chainsaw operations may directly and indirectly support the livelihoods of about 705,000 people.

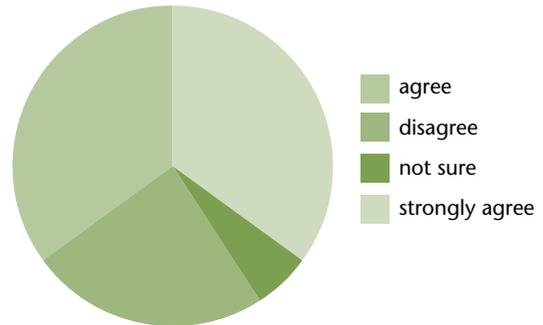
The formal industry reportedly consists of more than 200 logging and milling firms, which directly employ about 100,000 people (Adam and Dua-Gyamfi 2009a). Thus, CSM compares quite well with the formal industry in terms of job creation.

5.1.2 Social acceptance

Chainsaw milling is well accepted by stakeholders in Ghana. In a survey conducted by Marfo and Nutakor (2009) involving forest managers, chainsaw operators, farmers and the general public (including political leaders, chiefs and opinion leaders), about 80% of stakeholders agreed that CSM should be regularised. The report also showed that about 70% of the District Forest Managers thought that CSM should be regularised (Figure 5).

Figure 5. District Forest Managers' view of whether CSM should be regularised

Source: Marfo and Nutakor 2009;
n = 22



This observation is important; officials on the ground likely have a better understanding of the problems involved with enforcement than most of the participants who are privileged to be involved in national policy discussions. It also contradicts official national policy discourse on the subject, which tends to focus on enforcement.

5.1.3 Conflict between operators and communities

Conflicts related to CSM involve operators and communities (farmers), and operators and forestry officials (including court cases). The two most common operator-community conflicts involve consultation with farmers before logging and payment of compensation for crop damages. Discord related to compensation has been identified as one of the most pervasive conflicts in the forestry sector (Marfo 2006).

Even though the farmers and operators interviewed by Nutakor and Marfo (2009) mentioned incidences of conflict, in most cases there was also an indication of positive interaction between the two parties. In about 74% of the cases, farmers reported that they knew the operators who felled trees on their farms. This seems to support the claim that — notwithstanding misunderstandings that might arise — there seems to be significant connivance between farmers and chainsaw operators. This underlies support of CSM at the community level.

Nutakor and Marfo (2009) reported that more than 90% of the operators claimed to consult with farmers before removing trees on their farms. This was roughly confirmed by farmers; nearly 80% of them admitted that they were informed before trees were logged on their farms. Even though this rate of consultation seems high compared to observations in other studies (Marfo, Acheampong and Osae 2006),¹³

it could be assumed to be high since about 74% of farmers indicated they knew the operators. Furthermore, farmers also indicated that about 44% of the operators lived and operated within their own communities (Nutakor and Marfo 2009).

When logging occurred without prior consultation with the farmer, Nutakor and Marfo (2009) reported that most farmers (87%) eventually got to know the operators who did the logging; about 10% of them never knew who had done so.

Nutakor and Marfo (2009) showed that for 58% of farmers, bargaining with the operator was the most common method used to arrive at a settlement. In a few cases the farmer fixed the price; generally, the operator did so.

Perhaps surprisingly, 77% of farmer-operator conflicts were reported to have been resolved (Nutakor and Marfo 2009). According to farmers' claims, 47% of the cases were peacefully resolved, while in about 30% of the cases, force and mediated bargaining had to be used. More than 90% of cases as reported by operators were peacefully settled; they may not have been settled directly with the farmers, as this rate is higher than the 77% reported by farmers. The wide variance between the two rates may indicate some dissatisfaction on the part of owners/farmers. In cases where some engagement and bargaining was involved, 59% of farmers reported that the promised amount was paid. This is better than the 15%, 17% and 38% settlement rates observed by Marfo (2006),¹⁴ Ardayfio-Schandorf et al. (2007) and Marfo, Acheampong and Osae 2006, respectively.

Operators reported that a little more than 60 hours (about three full days) were required to be able to resolve specific conflicts. This is significant and could be frustrating for both farmers and operators.

Other studies, including Adam et al. (2007a) and Marfo, Acheampong and Osae (2006), have observed that conflict exists but is probably minimal since communities and farmers are likely to benefit more from CSM operations than from conventional logging. Adam et al. (2007a) also report that 62% of operators had no problems with communities. About 7% of the respondents, including farmers, chiefs and assembly representatives, mentioned that conflict, vandalism and a breakdown in law and order were some of the social costs of the illegal chainsaw operations in their communities.

5.1.4 Operator-FSD conflict

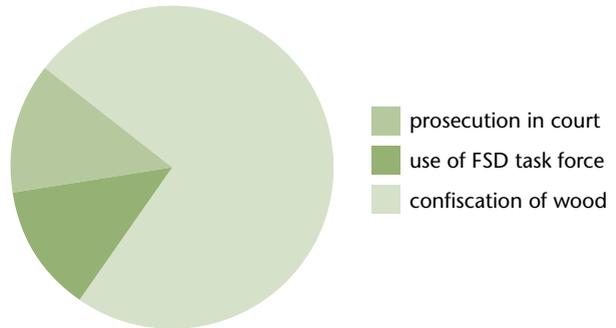
CSM has a significant impact on official monitoring resources. There is a huge cost to the enforcement agencies in terms of time; Marfo and Nutakor (2009) reported that FSD officials made an average of seven court appearances for each case, each of which lasted at least three hours. Marfo and Nutakor (2009) also reported that cases took an average two months in court and the number of adjournments was very high (19 times in some reported cases; see Inkoom 1999; Owusu 2004). Marfo and Nutakor (2009) further observed that most officials said they spent 25–75% of their time on chainsaw-related matters. This takes them away from their other duties.

Owing to the cumbersome nature of addressing chainsaw offences in the courts, most district managers find that direct confiscation or sales of products are the most effective ways to deal with offences (Figure 6).

Forestry officials are also faced with the possibility of violence when they have conflicts with illegal operators due to reported cases of violent clashes between these actors (Marfo and Nutakor 2009).

Figure 6. Most effective methods of resolving chainsaw offences

Source: Marfo and Nutakor 2009;
n = 22

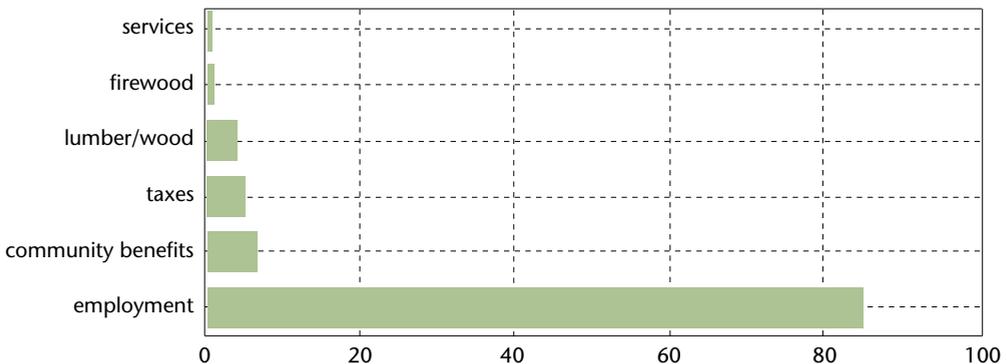


5.2 Economic impact

5.2.1 Impact on household and rural economy

Obiri and Damnyag (2009b) observed that chainsaw milling contributes in six major ways to the rural economy of Ghana: employment, community benefits, taxes, supply of lumber, supply of firewood and supply of services (Figure 7). Community benefits include infrastructure support (such as construction of bridges) provided by operators. In the timber markets, local government authorities collect tax on all wood products, whether they are legal or not. Provision of service includes vehicles for transporting lumber, which in distant forest locations were occasionally used to convey sick people to get treatment and to take food to market centres.

Figure 7. Economic contribution (%) of chainsawn lumber to rural economies, 2004–08



Source: Obiri and Damnyag (2009a); eight districts studied

The unemployment rate is generally high (20% in most rural areas of the country). The majority of the people who work in CSM are also involved in agriculture or farming. Chainsaw milling tends to be a lucrative off-farm source of income that supplements agricultural income rather than providing an alternative income source. This is confirmed by Adam et al. (2007a), who observed that the slump periods for chainsaw operations coincide with the busy farming periods.

Between 2004 and 2008, some communities benefited from infrastructure such as school buildings and wells (6%) and taxes (5%) for community development. CSM contributes significantly to the household budgets of operators in rural areas. More than half of those involved in chainsaw milling earn 80% of their household income from it (Obiri and Damnyag 2009b). The gross annual income earned by a sample of 98 people involved in diverse chainsaw-related activities was highly variable, with average annual earnings of GHC 2,000 and an observed maximum of GHC 35,000 (Obiri and Damnyag 2009b). The wide range in earnings may be explained by the different types and frequency of work.

Moreover, Obiri and Damnyag 2009b observed that, in general, the income earned from chainsaw operations was higher than that from alternative work in the communities. In the districts studied, operators working full time on chainsaw operations may earn as much as 24 times the income they would have been paid doing alternative work such as subsistence farming.¹⁵ The study cautioned, however, that some workers, particularly lumber carriers, could earn more income doing alternative work.

5.2.2 Potential loss of revenue to farmers

Chainsaw operators pay an average GHC 12 per tree¹⁶ directly to farmers (Obiri and Damnyag 2009b). This is only 38% of the estimated official stumpage value of circa GHC 31.5 per tree (i.e., 3 m³ average tree volume x GHC 10.5 per m³) for trees on farmlands. Under a regime of secured tree tenure, where farmers/land-owners could directly benefit from the sale of trees on their land, the farmers would therefore potentially lose an average of GHC 19.5. This is a potential loss of about GHC 16.4 million per year, given that chainsaw operators harvest about 842,000 trees a year. This observation is important in debates about reforming tree tenure rights to enable farmers and land-owners to have direct economic gains under a legal regime.

5.2.3 Impact on the national economy

The major adverse economic effect of illegal chainsaw milling on the Ghanaian economy is the loss of revenue to the state from stumpage and permit and conveyance fees. A report by Schmithüsen (2006) estimates the total revenue loss to the state from illegal logging operations, including chainsaw milling, at GHC 40.5 million per year, equivalent to about 2% of GDP.

In estimating the potential loss of revenue to the state, two main parameters were used:

- the average recommended stumpage rate, which is GHC 10.5/m³ (Birikorang and Rhein 2005); and
- the annual volume of trees harvested by chainsaw operators, which is estimated to be 2.5 million m³ (Table 13).

The analysis shows that the government may be losing more than GHC 25 million per year in stumpage that could have been collected from chainsaw operators. This is far more than the actual stumpage being collected by the FC¹⁷ from licensed loggers. In the first half of 2007, only GHC 4.2 million was collected as stumpage by the FC.¹⁸ Assuming that the annual stumpage collected is twice this amount (GHC 8.4 million), the potential loss would be about 300% of actual stumpage revenue. If half of the potential stumpage from chainsaw operators could be captured under a regularised regime and harvesting at current levels, this would amount to approximately GHC 12.6 million. This is almost equal to the total stumpage charged to contractors and about twice the actual stumpage revenue that the FC expected to collect and disburse in 2008.¹⁹

Since chainsaw operators currently pay about 38% of the potential stumpage revenue to farmers/land-owners as fees for trees (and assuming that the FC would be willing to pay this amount to farmers/land-owners to compensate them for protecting these trees) the FC could still retain revenue of about GHC 14 million annually from the potential stumpage of GHC 26.1 million. This is the figure that is really lost to the FC, since chainsaw millers do not pay stumpage because of the absence of a legal regime for their operations. This estimate does not include the revenue loss from land rents, export levies and other taxes related to industrial operations in the timber sector.

Many people support the idea of paying direct economic benefits to farmers as a way of building state-community partnerships to deal with illegal logging (Marfo 2004; Marfo, Acheampong and Osae 2006). The argument that the 50% (until recently, 40%) of timber revenue collected by the FC from off-reserve areas could be distributed to communities/farmers to compensate them for tending and managing naturally occurring trees on their lands/farms seems to be supported by the aforementioned observations. In fact, farmers earn almost this much in direct payments from chainsaw operators.

Marfo, Adam and Obiri (2009) estimated total informal payments in 2007 to be GHC 1.7 million, based on payments made by a sample of operators and the estimated number of chainsaw operators. This is about 55% higher than the 1999 estimation by Birikorang et al. (2001) of GHC 1.1 million. However, narrative accounts of operators support a volume-based approach to estimate informal payments. This is because the charges made by recipients of these payments are often based on the quantity of lumber being produced and transported. Thus, population-based estimates could be substantially underestimating informal payments. It is estimated

that chainsaw operators/dealers pay some GHC 33.5 million annually²⁰ in the form of bribes. Therefore, while the government is losing significant revenues, forestry officials, law enforcement agencies — and to some extent, local authorities and community members — are gaining substantially from CSM.

5.3 Environmental impact

The most pervasive argument levelled by stakeholders against CSM is its negative environmental impact and wasteful use of resources. Few detailed studies comparing the environmental impacts of CSM to other forms of logging have been done. In the sections below, information is presented about some indicators of environmental impact, including logging intensity, residues left in the forest, efficiency of conversion and adherence to conservation regulations.

5.3.1 Logging intensity in forest reserves

Transect surveys in previously logged compartments in Nkrabia and Asenayo forest reserves showed that illegal chainsaw activities were more frequent in areas closer to villages and distant from active logging areas (Adam and Dua-Gyamfi 2009b). In such areas, the harvesting intensity was as high as seven trees per ha. These harvesting intensities far exceed the conventional allowable felling intensity of two to three trees per ha.

Since CSM operators work mainly in previously logged compartments in forest reserves and harvest some very large trees, this would imply that these trees were left by previous loggers as seed trees or to give structure to the residual forest. Chainsaw operations can have three impacts on forest reserves:

- reduction in potential crop trees when immature stems are removed;
- reduction in seed supply and a subsequent decline in natural regeneration of popular timber species when seed trees are removed; and
- further opening of the canopy by removal of large trees retained for structure will significantly modify the microclimatic conditions, which may increase the seedling mortality of non-pioneer species and cause a shift in species composition, possibly in favour of low-value pioneer species.

Since these illegal activities are happening in compartments that have already been logged the implication is that the residual forest is being severely impoverished in terms of future economically harvestable timber.

5.3.2 Residue generation

To determine CSM residue, the ratio between total bole volume and volume recovered in planks and beams was calculated for 19 trees (from seven species) milled by illegal chainsaw operators in Nkrabia Forest Reserve. The estimated average plank/beam recovery was about $64 \pm 22\%$,²¹ with a range between 18% and 86% of log volume. The milling process generated residue amounting to 36% of the bole volume. The residues were composed of slabs, off-cuts in the shape of billets and sawdust.

5.3.3 Is chainsaw milling efficient?

The efficiency of chainsaw operations in terms of lumber recovery has been much debated in the chainsaw milling discourse. Some data suggest that there is little difference between the recovery rates of chainsaw milling and conventional sawmilling. Owusu et al. (2009) compared the recovery of lumber as a percentage of log volume (processing efficiency, or PE) and usable tree volume (conversion efficiency, or CE) using different milling techniques and compared their efficiency (Table 20) with sawmill recovery rates recorded by Gyimah and Adu-Gyamfi (2009).

Table 20. Comparison of conversion efficiencies of different mill types

sawing technique	log recovery (%)	processing efficiency mean (%)	range (%)	conversion efficiency mean (%)
freehand chainsaw ^a	70	43.4	32–57	30.4
chainsaw with attachment (Logosol) ^a	67	49.6	41–62	33.2
portable mill (Wood-Mizer) ^a	80	70.7	68–72	56.5
sawmill ^b	not measured	53.9	28–64	37.7

Source: a) Owusu et al. 2009; b) Gyimah and Adu-Gyamfi 2009

Three observations can be made:

- the Wood-Mizer had the greatest processing efficiency and conversion efficiency;
- a chainsaw with attachments such as Logosol has a processing efficiency that is 6% higher than that of freehand chainsaw milling; and
- although sawmills had a higher mean recovery than chainsaws with attachments and freehand chainsaws, the range in minimum and maximum values suggest that any conclusions about efficiency of technique should be made with caution. For example, some sawmills had a recovery rate as low as 28%; the lowest rate for freehand chainsaw milling was 32%. Species density, bole volume and machine efficiency, as well as the experience of operators, are important determinants in lumber recovery.

5.3.4 Logging restrictions

Field observations and interviews with operators revealed that chainsaw millers were felling a wide range of tree sizes and were unaware of the felling restrictions on harvestable diameters. For instance, Adam and Dua-Gyamfi (2009b) report that nine and six out of 21 trees felled by chainsaw millers in Nkrabia Forest and Asenayo, respectively, were below the size limit. Adam et al. (2007a) also reported that nearly 40% of the operators harvested trees that were smaller than 50 cm DBH, which is below the minimum felling limit of 70 cm.

It is interesting to note that most of the trees harvested from the forest reserves were high value and high demand species, even restricted species such as baku (*Tieghmella heckelii*).

Adam and Dua-Gyamfi (2009b) report that chainsaw millers have extended their operations into protected and sensitive ecological areas such as Globally Significant Biodiversity Areas (GSBAs; Box 4) and convalescent areas in forest reserves. Their reconnaissance survey in GSBAs within Tano Offin and Atiwa Range forest reserves also revealed a high incidence of chainsaw milling.

Areas set aside in forest reserves to convalesce (i.e., to recover from heavy exploitation) are not included in Timber Utilization Contracts. In most cases convalescent areas have individual large timber trees that are scattered over a wide area, but concentrated in a way that would allow for economic logging. Invariably these scattered trees have become the target of illegal chainsaw millers. Many TUC holders interviewed by Adam and Dua-Gyamfi (2009b) questioned the relevance of convalescence areas as a management intervention if the remnant trees could not be protected against illegal felling.

The fact that chainsaw milling is wasteful and destructive in some cases seems to stem from a lack of technical know-how and the illegal framework in which operators work. Administrative and capacity-building issues — such as directional felling, logging intensity and choice of operation site — could be addressed in a regularised environment.

BOX 4. GLOBALLY SIGNIFICANT BIODIVERSITY AREAS

Globally Significant Biodiversity Areas (GSBAs) are set aside within a forest reserve to ensure that some forest blocks are preserved in a condition that is as close to natural as possible in order to preserve unique flora and fauna. The GSBA concept is an innovation in conservation. It calls for the protection and conservation of all kinds and sizes of living organisms as well as the ecosystems within which they have evolved, in this case the tropical high forest. In order to ensure its effectiveness and acceptance, the GSBA concept is being pursued through collaborative management planning and implementation processes. The communities near GSBAs are benefiting from schemes such as alternative livelihoods and from small grants. In return, they help prevent illegal activities in the GSBA, among other things.



Chapter 6

Conclusions and policy recommendations

6.1 Context

Ghana is in a dilemma as to how to deal with CSM in both policy and practice. Information to support policy discussions on the subject is crucial. Understanding the drivers of CSM — and its social, economic and environmental impacts — is particularly important when designing adequate policy responses.

The introduction of the EU-Ghana Voluntary Partnership Agreement (VPA) in 2008 highlighted the need to resolve the CSM issue. The question of legal timber and how it can be addressed in the domestic market is central. Within the current regime of prohibition and ineffective enforcement, it is difficult to see how Ghana will be able to satisfy the legality assurance criterion of the VPA when its domestic market sells illegal chainsawn lumber. If the legal timber dimension of the agreement is enforced, it is likely that Ghana's export trade with the EU will be affected, since full assurance of legality of timber being exported will be in doubt.²²

6.2 Conclusions

The main statistics obtained from the analysis in this report are summarised in Table 21. Six major factors contribute to the ineffective enforcement of the CSM ban:

- corruption among FSD officials;
- corruption among law enforcement agencies;
- the high rate of rural unemployment;
- the lack of political will to enforce the ban;
- market demand (i.e., the availability and relatively cheap price of chainsawn lumber); and
- political interference, particularly by chiefs and local politicians.

Table 21. Summary of CSM statistics

description	estimate	reference
total annual gross revenue from CSM	GHC 279 million	Section 3.6.4
annual gross revenue retained by chainsaw operators	GHC 52 million	Section 3.6.4
total annual profit from CSM	GHC 37 million	Section 3.6.3
net profit of CSM	GHC 66.6/m ³	Table 16
volume of trees annually harvested by CSM	2.5 (2.2–2.9) million m ³	Table 13
number of trees harvested	842,000 (745,000–970,000)	Section 3.5.3
conversion efficiency of CSM, based on total usable tree volume	30.3%	Table 11
number of species processed by CSM	72	Section 3.4.2
dominant species supplied to market	mahogany, wawa, dahoma, ofram	Section 3.4.2
volume of CSM lumber sold in the market	558,054 m ³	Table 13
volume of chainsawn lumber consumed in Ghana from the domestic market	496,815 m ³	Table 13
proportion of chainsawn lumber in the market	84%	Table 13
number of people directly (and indirectly) engaged by CSM	97,000 (direct) 138,000 (direct and indirect)	Table 19 Section 5.1.1
annual potential stumpage revenue lost by the FC	GHC 25 million	Section 5.2.3
estimated annual value of informal payments	GHC 33.5 million	Section 5.2.3

6.2.1 Social and economic benefits

A specific economic, social and political environment drives chainsaw milling. Most stakeholders recognise that chainsaw milling is important, both as an employer of rural youth and a supplier of domestic timber. Regularization or eradication of chainsaw milling could adversely affect the rural economy and the enterprises that depend on CSM for lumber.

6.2.2 Dwindling forest resources

If the estimated harvest of about 2.5 million m³ by chainsaw operators is added to the official AAC of two million m³, it results in an annual potential harvest level of 4.5 million m³. Based on timber inventories and yield calculations, this is approximately four times the sustainable harvest established in 1996 (Planning Branch 1999). It is doubtful that the state of the forest resources in Ghana today can sustainably accommodate an annual exploitation level of more than one million cubic metres. If the current level of exploitation continues, a serious shortage of merchantable trees is imminent.

6.2.3 Access

Tenure reforms that recognise some ownership or management rights on the part of communities, especially outside forest reserves, are an important consideration. In practice, farmers already decide the fate of trees on their land. The current regime of benefit-sharing — which alienates communities — needs major restructuring in order to gain community support in the management of forest resources.

6.2.4 Policy reform: lifting the ban?

Chainsaw operations need to be regulated, either through effective enforcement of the ban or by being integrated into mainstream forest management and operations. Declaring that chainsaw milling is illegal without addressing the timber markets that sell its “illegal” products is not realistic or effective.

The legal framework criminalises the use of chainsaw milling and trading for commercial purposes, although its enforcement has been fraught with difficulties and inconsistencies. The law does not criminalise CSM for household use, but the FSD’s Manual of Operations fails to provide straightforward procedures for domestic use permits. This makes it difficult to use a chainsaw to mill timber for local consumption.

Studies of social, economic and environmental impacts show that most of the negative impacts of chainsaw milling are the result of its being banned and of the attendant problems of ineffective monitoring, rather than the practice itself. If the fundamental reason for the chainsaw ban was its adverse environmental impacts, the empirical observations in the study do not support this claim.

In spite of the ban on chainsaw milling in Ghana, the practice is highly accepted among the general public. It is also supported by some stakeholders, including more than half of FSD District Managers. The timber trade associations, especially the Ghana Timber Millers’ Organization, oppose it, however.

Since chainsaw milling has broad social acceptance and significant economic impacts and it supplies a critical domestic market, maintaining a ban without effective enforcement capability will likely only enforce connivance and illegality.

Enforcing the ban will be challenging unless three critical conditions are simultaneously met:

- the timber industry is prepared to supply wood to the domestic market;
- FSD procedures are streamlined to allow for the processing of timber for domestic use; and
- resource governance is significantly improved (particularly in terms of corruption within the FSD and law enforcement agencies) and genuine political will for addressing chainsaw milling is secured.

Since it is unlikely that these conditions can be met within the near future, and since chainsaw milling is increasing, some immediate interventions should be instituted.

Even though there is increasing pressure to lift the ban, the study suggests that this option should be approached with caution. Several issues related to tenure, procedures and monitoring still need to be resolved:

- How should policy initiatives address requests for timber for domestic purposes by individuals?
- What specific provisions are needed in the procedure manual for harvesting timber outside reserves to address the domestic use of timber using registered chainsaws?
- What capacity in terms of FSD personnel and logistics is needed under a regularised chainsaw milling regime?
- What licensing mechanism is needed to integrate chainsaw operations?
- How will the government ensure equity in the payment of economic rent (or stumpage) for trees?
- What are the impacts, especially on the resource base and the domestic market, of an arrangement that regularises chainsaw milling?

6.2.5 Domestic timber supply

Approaching the problem from the demand side is a more practical option. Without addressing the issue of domestic timber supply within the context of the production and supply of legal timber, it may almost be impossible to develop and enforce an adequate chainsaw milling policy. CSM is increasing because the high local demand for lumber is not being met from sawmills and because it provides a wider range of species and dimensions. Supplying this demand with legal timber must be the basis of any policy option. This requires obtaining accurate information on the size of the demand in the domestic market, and assessing whether legal sawmills can meet this demand and whether the forest base can sustain this demand.

6.2.6 Distribution of benefits

Chainsawn lumber production has become a key contributor to rural livelihoods. This, coupled with the apparent connivance of operators with FSD staff and traditional resource owners, underlies the difficulty that the country will face in developing regulations. It may be necessary for the state to consider incentives to ensure that adequate benefits from tree resources are paid, especially to farmers and land-owners.

Many people support the idea of paying financial benefits directly to farmers as a way to build a state-community partnership that can address illegal logging (Marfo 2004; Adam et al. 2007a). It has often been proposed in forestry meetings that 40 percent of timber revenue collected by the FC from off-reserve areas be distributed to communities or farmers as a way to compensate them for tending and managing the trees on their lands and farms. This seems to be supported by economic analysis. Farmers already gain almost this much through direct payment from chainsaw operators.

6.2.7 Operators' perspectives on regularised forms of chainsaw milling

In terms of the ways in which chainsaw activities should be regularised, at least 70% of operators want concessions to be given for registered groups of operators, 18% want individual permits and 6% want small concessions for individuals. Most operators were in favour of any system that dealt with organised groups (Acheampong and Marfo 2009).

The information presented in Table 17 shows that chainsaw operators are willing to pay for trees under a regularised regime in some way, and that the price they are willing to pay for high quality trees compares favourably to current stumpage fees.

6.2.8 Multi-stakeholder dialogue

A process is needed to review the ban of CSM and design innovative policy options to address the issue of supplying the domestic timber market with legal timber. Stakeholders need to be engaged in this process as soon as possible. A multi-stakeholder dialogue approach is crucial; the drivers for CSM cut across social, political, environmental and economic realms and involve a range of interests.

Several factors must be considered when beginning discussions to design innovative policy options:

- Dealing with sector corruption, particularly within the FSD district-level staff and the police, is a fundamental requirement.
- Policy discussions need to be approached with an open mind, because of the general social acceptance of CSM, and because most stakeholders are in favour of regulating the activity rather than maintaining a ban that cannot be enforced.
- In order to be effective, policies must have the participation of key stakeholders, including legal and illegal loggers.
- It is vitally important to deal with local elite interests.
- The applicable laws on CSM must remove the ambiguities often encountered by practitioners. It may be useful to subject these interpretations to further public and stakeholder discussion.
- The procedure manuals for harvesting timber need to be revised to accommodate a range of methods for obtaining and processing timber for domestic use.
- Research should continue to be an important part of policy discussions. Stakeholders need relevant information when considering options and impacts.

6.3 The way forward

In spite of the fact that chainsaw milling has been banned for more than ten years in Ghana, the practice continues and is highly accepted by the general public. Free-hand chainsaw milling is perceived to be very wasteful, and also very difficult to control. For any policy option to be effective, it should aim to optimise the advantages of chainsaw milling while at the same time reducing any adverse effects of the practice. The policy should also address the drivers that give rise to the perpetuation

of CSM. From the chequered history of the ban and experiences elsewhere in Africa, the transformation of chainsaw milling into artisanal logging is an interesting option that is worth exploring.²³

The domestic market demand for lumber has been identified as the major driver for illegal CSM in Ghana. Without addressing this issue within the context of the production and supply of legal timber, it may almost be impossible to develop and enforce an adequate CSM policy.

The following recommendations were formulated based on a case study of chainsaw milling in Ghana (Marfo, Adam and Obiri 2009), an international workshop in 2009 on chainsaw milling (TBI 2009) and a two-day technical working committee meeting.²⁴

The way forward lies in reconciling the demand for adequate legal timber for the domestic market with the sustainable production capacity of the forest resource. Export policies should be fully aligned with domestic market policies since both markets draw timber from the same resource. Ultimately, supplies may have to come from plantations and elsewhere. For now, however, three possible policy directions are identified to address the domestic market demand from existing forest resources:

1. Sawmills alone to supply the domestic market with legal timber

This policy option implies the maintenance and full enforcement of the chainsaw milling ban, and the development of a range of options to encourage sawmills to supply domestic markets.

2. Sawmills and artisanal millers to supply the domestic market with legal timber

This policy option implies some form of regularisation of chainsaw milling and allocation of harvesting rights to artisanal millers and the logging industry. Objectives for on-reserve and off-reserve forest management will have to be determined. Options must be developed to create equitable conditions for sawmillers and other participants in the domestic market.

3. Artisanal millers alone to supply the domestic market with legal timber

This policy option implies some form of regularisation of chainsaw milling and allocation of harvesting rights to artisanal millers and the logging industry. Objectives for on-reserve and off-reserve forest management will have to be determined.

In view of the diverging perspectives held by different participants, a multi-stakeholder process is needed to select a policy direction for supplying the domestic market with legal timber on a sustainable basis. Multi-stakeholder discussions and analysis should map out consequences and identify ways to implement each policy option. The outcome and recommendations from these discussions could then form the basis of a sector policy to address chainsaw milling in Ghana.

The VPA process in Ghana has adopted a multi-stakeholder dialogue approach. Through this approach, it has addressed the legality assurance system, timber procurement policies, and regularization of the supply of legal timber to the domestic market, among other topics.

The EU-TBI chainsaw-milling project, “Developing alternatives for illegal chainsaw milling in Ghana and Guyana through multi-stakeholder dialogue,” is facilitating a multi-stakeholder dialogue in Ghana. In this process all stakeholders participate in decision making. They are supported by sound information that informs them and enables them to weigh the merits of various options. By addressing illegality in the domestic market, this process is supporting the VPA process in Ghana. It may be helpful to adopt one multi-stakeholder process with multiple sources of funding and support to focus on the key policy issues. This will optimise stakeholder energies and may be more efficient in addressing the core issues and policy options for CSM.

A number of other conditions must be met for any policy to be successful. Freehand chainsaw milling is considered to be incompatible with any of these options:

- Apply and enforce a scientifically supported sustainable AAC throughout the forest estate, in particular the Forest Reserves.
- Stimulate tree growing on farms and in plantations to increase future supply.
- Since any option will lead to a reduction of opportunities in the chainsaw subsector, there will be a need to provide efficient and competitive alternative livelihoods for displaced chainsaw operators.
- Register and provide a code of conduct for all lumber traders/dealers.
- Improve rural community access to timber for non-commercial use by artisanal practices through leases or other forms of user rights.
- Optimise the harvest of yield allocation.
- Ensure that statutory fees are paid (and collected) regularly and promptly.
- Enhance the capacity of the Forestry Commission in forest monitoring.
- Improve mechanisms for involving rural communities in forest monitoring.
- Establish mechanisms to induce political will for policy implementation.
- Improve benefit sharing of timber revenue to include farmers.
- Formalise cross border trade with industry.
- Mount a vigorous consumer campaign against freehand chainsawn lumber.
- Introduce a public timber procurement policy.

The strategy to reduce this practice will depend on the policy options selected. A general timber harvesting and trade improvement policy arrangement must be in place to enable any of the specific policy options to work as expected.

Apart from the general conditions mentioned above, a number of specific conditions as listed in Table 22 would have to be met. These conditions would have to be discussed and evaluated by a broader stakeholder group (multi-stakeholder dialogue), in terms of what each would cost and what their implications would be.

Furthermore, the multi-stakeholder dialogue should identify specific actions to address the drivers of CSM in light of the recommended policy options.

Table 22. Specific conditions and constraints for policy options

policy option	specific conditions	constraints
<p>1. Sawmills to supply the domestic market with legal timber obtained from sustained yields</p>	<p>Develop fiscal measures and other mechanisms to induce saw millers to supply lumber to the domestic market.</p> <p>Work out modalities for sawmillers to supply the required volume of lumber to the domestic market.</p> <p>Link FLEGT and other licensing for export to the supply of a quota to the domestic market.</p>	<p>Continued costs, efforts and political will are needed to effectively enforce a chainsaw milling ban.</p> <p>There are costs to government to bridge the gap between prices in the domestic and export markets.</p>
<p>2. Sawmills and artisanal millers supply the domestic market with legal timber obtained from sustained yields</p>	<p>Provide organised artisanal practitioners legal access to off-reserve timber resources in conformity with the AAC.</p> <p>Impose the same tax and stumpage fees on sawmillers and artisanal practitioners.</p> <p>Work out ways for sawmillers to supply a defined quota of lumber required by the domestic market.</p> <p>Develop fiscal measures and other mechanisms to induce sawmillers to supply lumber to the domestic market.</p> <p>Link FLEGT and other licensing for export to the supply to the domestic market.</p>	<p>Time, effort and political will are needed to organise and regularise the chainsaw milling subsector and deal with “free riders.”</p> <p>There are costs to government to bridge the gap between prices in the domestic and export markets.</p>
<p>3. Artisanal improved mills to supply all lumber required by the domestic market while sawmills focus on export, in keeping with sustained yields</p>	<p>Pilot and roll out artisanal milling teams (mobile recovery teams).</p> <p>Provide organised artisanal practitioners legal access to off-reserve timber resources in conformity with the AAC.</p> <p>Impose the same tax and stumpage fees on sawmillers and artisanal practitioners.</p>	<p>Time, effort and political will are needed to organise and regularise the chainsaw milling subsector and deal with “free riders.”</p>

Endnotes

1. The actual amount of wawa in the market may be overestimated. Although many wood sellers refer to any whitish wood species as wawa (since it is popular with consumers), it is difficult for the uninitiated to identify the species.
2. These figures are comparable to the 31% obtained in a recent study in Liberia (see Blackett, Lebbie and Marfo 2009).
3. Another recent survey (Adam and Dua-Gyamfi, 2009a) gave a share of 86%. Compared to the average of 70% reported between 1999 and 2004 (TIDD 2005), it shows the growing importance of chainsawn lumber as a supplier to the domestic market.
4. This is very conservative; Blackett and Gardette themselves admitted that, "as a result of the unreliable official statistics covering the domestic and regional timber trade in Ghana, no concrete conclusion can be made about the volume and value of the overland timber trade."
5. This was measured from experimental trees with diameters comparable with what chainsaw millers are generally known to exploit. Using average tree volume based on normal average tree diameters of 7.5m³ in conventional commercial logging (cf. Adam et al. (2007a) will give a lower number trees exploited.
6. The unit committee consists of both elected and appointed members of a community, represents the community at the District Assembly and serves as a local government authority that helps to execute government programs at the community level.
7. For a detailed account of the influence and power of the timber industry in Ghana, see Asante 2005 and Marfo 2006.
8. GTMO claims to have done its own assessment; it says that its members currently supply about 21% of their production to the local markets (Acquah-Moses, pers. comm.).
9. Of the 110 sawmills registered with the TIDD in Ghana as of 2000, more than 85 were located in Ashanti and Western regions.
10. The participants included lawyers from the Forestry Commission, a high court judge nominated by the Judicial Service, independent barristers and legal researchers. Meeting held on October 7, 2008 at the Forestry Commission, Accra.
11. Nutakor personal communication (information from farmers in Asubima Forest reserve area).
12. <http://www.ghanaweb.com/GhanaHomePage/general/statistics.php>.
13. Marfo et al. (2006) observed that in 73% of the 115 cases studied, timber contractors did not consult farmers before logging. What is not clear is the proportion of loggers who were registered (legal) and unregistered (illegal).
14. This study involved only licensed loggers.
15. This should be understood in the context of most rural people being engaged in subsistence farming.
16. One US\$ was equivalent to GHC 1.4 in May 2009.
17. The FC is known to have the lowest rent collection record in West Africa (Birikorang and Rhein 2005); it is reported that between 2000 and 2003, it captured less than half of the revenue accrued to it. The situation has been improving.
18. Data from www.fcghana.com, 10/4/09.
19. Only GHC 4.2 million was invoiced to contractors and about GHC 2 million was actually disbursed to beneficiaries in the first half of 2008. Total indebtedness including arrears is about GHC 8.9 million. Source: www.fcghana.com.
20. Amount estimated was 33,569,280; an average informal payment of GHC 60.16 was made for every cubic metre of lumber produced and transported (see page 29) and an annual volume of 558,000 m³ of chainsawn lumber reaches the market.
21. Standard deviation.
22. The EU buys 60% of Ghana's export timber. It provides about 70% of the Ghana government's development budget and about 40% of recurring expenditures (see Opoku 2006).
23. Artisanal millers are trained chainsaw millers who make use of more efficient equipment, such as Logosol or Wood-Mizer.
24. www.tropenbos.org/images/Tropenbos/Eu-chainsawmilling/documentation/minutes_of_technical_meeting_10_11_06_2009.pdf.

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Annex 1. Employment estimates

Few direct data are available on employment created by the illegal chainsaw sector. An approximation of the number of full-time jobs created by CSM can be derived from estimates of total production (Tables 13 and 14), information about the productivity of the various work stages in the chainsaw product chain and average crew sizes (data mostly derived from Adam et al. 2007a and Marfo and Acheampong 2009).

The estimate reported in Table 19 is derived as follows:

Definition of parameters		unit	measured value	calculated result	reference
Production data					
annual volume of timber processed (local market and direct export market)	a	m ³ .y ⁻¹		756,815	Table 13
annual volume of timber processed (local market)	b	m ³ .y ⁻¹		558,054	Table 13
recovery rate	c	%	30.3		Table 13
annual RWE of processed chainsaw lumber	d=100* a/c	m ³ .y ⁻¹		2,497,739	Table 13
Stump site (local and direct export markets)					
volume processed per crew per operation	e	m ³ . operation ⁻¹ . crew ⁻¹	5.94		Table 7
annual number of operations per operator	f	operations. crew ⁻¹ .y ⁻¹	60		Adam et al. 2007a; Marfo et al. 2009
annual volume processed per crew	g=e*f	m ³ .crew ⁻¹ .y ⁻¹		356.40	
number of crews	h=d/g			7,008	
average size of operating crew	i	workers. crew ⁻¹	6		Adam et al. 2007a; Marfo et al. 2009
number of workers (stump site)	j=h*i			42,049	
Haulage (local and direct export markets)					
average load per truck	k	m ³ .truck ⁻¹	26.5		Adam et al. 2007a; Marfo et al. 2009
annual number of round trips per truck	l	roundtrip. truck ⁻¹ .y ⁻¹	96		Table 8
annual volume of lumber hauled per truck	m=k*l	m ³ .truck.y ⁻¹		2,544	
number of trucks needed to transport annual production volume	n=a/m	trucks		297	

average size of haulage crew	o	workers. truck ⁻¹	7		Adam et al. 2007a; Marfo et al. 2009
number of workers (haulage)	p=n*o	workers		2,082	
Resawing (local market)					
annual capacity of resaw mill	q	m ³ .y ⁻¹ .mill ⁻¹	92.34		Adam et al. 2007a; Marfo et al. 2009, assuming 240 working days
number of mills	r=b/q	mills		6,044	
average size of the resaw crew	s	workers. crew ⁻¹	4.5		Adam et al. 2007a; Marfo et al. 2009
number of workers (resaw mills)	t=r*s	workers		27,197	
Retailing (local market)					
average annual sales per firm	u	m ³ .firm ⁻¹ .y ⁻¹	497		Adam et al. 2007a; Marfo et al. 2009
number of firms	v=b/u	firms		1,123	
average crew size	w	workers. firm ⁻¹	3.5		Adam et al. 2007a; Marfo et al. 2009
number of workers (retail)	x=v*w	workers		3,930	
Total estimated number of people engaged directly in chainsaw milling				75,258	

This calculation depends on numerous assumptions:

- The estimates for the various parameters are subject to variation and are sometimes based on a limited number of data. This applies in particular to conversion efficiency and CSM production estimates, and to productivity estimates.
- The calculation assumes that there are no conversion losses between the stump site and the point of sale in the market (where the production figure was estimated). Inclusion of conversion losses would increase the employment estimate at each stage except retail.
- The calculation ignores the possible contribution of chainsawn lumber entering the legal chain. Inclusion would increase the number of workers at the stump site and the haulage employment estimates.
- The calculation ignores home consumption and direct sales that do not go through the market. Inclusion would increase the number of workers at the stump site and the haulage employment estimates.
- The calculation assumes full-time involvement of workers and ignores indirect jobs created by CSM. See also Table 19 and Chapter 5.

Annex 2. Local and scientific names, commonly traded species

local name	scientific name
wawa	<i>Triplochiton scleroxylon</i>
dahoma	<i>Piptadeniastrum africanum</i>
ofram	<i>Terminalia superba</i>
ceiba	<i>Ceiba pentandra</i>
mahogany	<i>Khaya</i> spp.
esa	<i>Celtis</i> spp.
kyenkyen	<i>Antiaris toxicaria</i>
emire	<i>Terminalia ivorensis</i>
watapuo	<i>Cola gigantea</i>
nyamedua	<i>Alstonia boonei</i>

Acronyms

AAC	Annual allowable cut
CE	Conversion efficiency
CEPS	Customs, Excise and Preventive Service
CSM	Chainsaw milling
DA	District Assembly
DBH	Diameter at breast height
DFID	United Kingdom Department for International Development
DFO	District Forestry Office
ENGO	Environmental Non-governmental Organization
EU	European Union
FC	Forestry Commission
FD	Forestry Department
FDMP	Forest sector development master plan
FLEGT	Forest Law Enforcement, Governance and Trade
FORIG	Forestry Research Institute of Ghana
FPIB	Forest Product Inspection Bureau
FSD	Forest Services Division of the Forestry Commission
FWP	Forest and Wildlife Policy
GDP	Gross Domestic Product
GHC	Ghana Cedi
GSBA	Globally Significant Biodiversity Area
GTA	Ghana Timber Organization
GTMO	Ghana Timber Millers Organization
HFZ	High Forest Zone
LI	Legislative Instrument
LIF	Lumber Information Form
MFL	Minimum Felling Limit
MSD	Multi-Stakeholder Dialogue
NGO	Non-governmental Organization
NRCD	National Redemption Council Decree
PE	Processing Efficiency
SFM	Sustainable Forest Management
SMCD	Supreme Military Council Decree
SP	Salvage Permit
SSLT	Sustainable Supply of Legal Timber
TBI	Tropenbos International
TIDD	Timber Industry Development Division
TIF	Timber Information Form
TUC	Timber Utilization Contract
TUP	Timber Utilization Permit
VPA	Voluntary Partnership Agreement



This report was produced within the framework of the “Developing alternatives for illegal chainsaw milling in Ghana and Guyana through multi-stakeholder dialogue” project. This chainsaw milling project is being carried out by Tropenbos International in collaboration with the Forestry Research Institute of Ghana (FORIG), the Forestry Commission (FC) of Ghana and the Forestry Training

Centre (FTCI) and Iwokrama in Guyana. It 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. The project’s overall objectives are to reduce poverty and promote viable livelihood in forest-dependent communities; reduce illegal logging; and promote the conservation and sustainable management of tropical forests in Ghana and Guyana.

In spite of being banned in 1998, chainsaw milling continues to be a major supplier of Ghana’s domestic lumber needs. Chainsaw milling helps to sustain rural economies and livelihoods, and banning it fuels illegal practices and conflict. Chainsaw milling challenges Ghana’s ambitions to develop a legal and sustainable forestry sector. Addressing the issue in an equitable way will reduce conflicts in the forest sector, diminish forest degradation and support rural livelihoods.

This synthesis report examines the evolution of the policy, legal and institutional framework of chainsaw milling in Ghana. Based on new research and a review of recent studies, it provides insights into the social, political, legal and economic factors that drive chainsaw milling and assesses its impacts on livelihoods, forests and the timber sector. The report recommends a number of measures to more effectively regulate the practice to meet stakeholders’ needs and help Ghana achieve sustainable forest management goals.

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