

Occupational Health and Safety of Employees in Wood Processing Industries in Cameroon

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Abstract: Workers safety in Africa faces significant challenges, marked by the high number of workplace accidents, inadequate support from employers, a general shortage of personal protective equipment across all industries, insufficient controls, and unequal legal frameworks across countries. This article provides some answers both to help reverse the trend of occupational accidents and to raise awareness among decision-makers in African countries.

Keywords: Wood; Safety; Occupational Accident; Anomaly; Work Permit; Material Handling Operations; PPE; ILO; Safety Meeting.

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I. INTRODUCTION

As part of its contribution to Cameroon's economic development, wood processing, in line with the orientations of the Head of State, has resolutely embraced the vision of a dynamic Cameroonian industry capable of creating wealth through the promotion of wood processing activities. Consequently, particular emphasis is placed on occupational safety in general and on safety in processing industries in particular.

Since January 2023, a circular has established the status of student entrepreneur within Cameroon's public and private higher education institutions under the "Study and Entrepreneurship" programme. Among other objectives, this status seeks to strengthen students' practical training, promote the socio-professional integration of higher education graduates into innovative and competitive sectors, and encourage business creation in accordance with Law No. 2001/005 of 16 April 2001 on the orientation of higher education. This entrepreneurial orientation was further reinforced by Law No. 2023/007 of 25 July 2023 on the orientation of higher education in Cameroon.

Regarding the employment situation of higher education graduates, the level of integration remains very low, with an unemployment rate of 17.6%. These graduates include those from engineering schools, faculties, and other higher education institutions who possess skills in various fields. However, it must be acknowledged that students tend to seek employment primarily in public administrations or companies, while neglecting the entrepreneurial

development of their research projects or final-year projects, which very often have considerable potential.

The forests of the Congo Basin cover an area of 300 million hectares, making them the world's second-largest forest massif after the Amazon. This area represents 7% of the world's forests and 22% of the world's tropical forests and extends across several countries, including Cameroon (11%), the Central African Republic (3.4%), the Republic of Congo (12.4%), Equatorial Guinea (1.3%), Gabon (17.4%), and the Democratic Republic of Congo (54.4%) (FAO, 2011).

In Cameroon, 41% of the national territory is covered by dense forests, while wooded formations account for 70% of the country's total surface area. More than 50 million hectares of forest are devoted to timber production. The dominant form of production forest is the forest concession. In 2018, Cameroon had 117 forest concessions covering a total area of approximately 7 million hectares, with an average area of 57,000 hectares.

At the global level, the Congo Basin occupies an extremely marginal position, accounting for approximately 1% of global log production, 5% of global tropical log production, 6% of global tropical sawnwood production, 7% of global tropical veneer production, and 1% of global tropical plywood production.

The contribution of this sector to Gross Domestic Product (GDP) is approximately 6%, making it the country's third-largest economic sector after oil production and

agriculture. Cameroon's timber production capacity is estimated at 5 million cubic metres of standing timber per year. Approximately 3 million cubic metres represent the volume of roundwood harvested annually (FRM, 2018).

This annual production is concentrated on a few high-commercial-value species, including ayous (*Triplochiton scleroxylon*), sapelli (*Entandrophragma cylindricum*), tali (*Erythrophloeum ivorense*), and azobé (*Lophira alata*).

At the beginning of the 1990s, many Congo Basin countries adopted innovative forestry legal frameworks intended to ensure the sustainable management of forest resources from the perspectives of biodiversity conservation and the industrialisation of timber production. More than three decades after these frameworks were established, the contribution of the timber sector to the development of Central African countries remains limited compared with the sector's potential to diversify the economies of the sub-region.

The integration of available timber raw materials into production chains remains inefficient, with material yields of approximately 30%. Despite restrictions on log exports and the existence of an international market, secondary wood processing industries are characterised by very low production levels. Plywood, for example, which is the principal product of this industry, accounts for only 3% of exports from ITTO producer countries.

Paradoxically, this industry has considerable potential for innovative ideas and could become more involved in research and development activities. The limited efficiency of primary and secondary wood processing industries can be explained by several factors, the most important of which include: (i) the use of rudimentary technologies in industrial production units; (ii) inadequate supervision and a lack of specialised skills in a sector with highly specific characteristics; (iii) the absence of a properly funded research and development institution capable of implementing major national and regional programmes; and (iv) the absence of infrastructure responsible for promoting research results and innovative technologies and transferring them to developing countries.

The paradigm surrounding woody raw materials has changed: a tree contains wood fibre rather than simply solid wood. On this basis, three major growth markets for the international wood industry have progressively emerged in recent years: sustainable construction, bioenergy, and biomaterials.

At the local level, the adoption and implementation of this new paradigm remain very limited.

➤ Sustainable Construction

Construction is one of the most energy-intensive industries and one of the major sources of greenhouse gas (GHG) emissions.

II. MATERIALS AND METHODOLOGY

The resulting climate change and environmental impacts have created an urgent need for a progressive transition towards industries that emit significantly less carbon dioxide and are more environmentally friendly.

The construction of sustainable buildings, particularly through the reduction of their carbon footprint and the improvement of their thermal and energy performance, lies at the heart of this approach. The use of wood as a bio-based material with relatively low carbon emissions therefore appears to be an attractive solution.

In Cameroon, the housing deficit remains extremely high. Among the least affluent social groups, it exceeds one million housing units (UN-Habitat, 2015). The construction of bio-sustainable housing requires the contribution of wood processing industries. These industries should therefore control and reduce occupational accident rates.



Fig 1 Model of a Safety Helmet

Source: Author

Worker safety in Cameroon's wood and forestry industries remains a major challenge, characterised by a high level of occupational risks and workplace accidents, including irritation, injuries, accidents at work, and exposure to wood dust, combined with limited use of personal protective equipment (PPE).

Despite the framework established by the Labour Code (Law No. 92-007), the effective application of safety standards, training, and medical monitoring remains crucial to reducing occupational accidents and diseases.

Forestry and the wood industry continue to rank among the most dangerous industrial sectors in most countries. Worldwide, discouraging trends can often be observed, including increasing accident rates and high proportions of occupational diseases and early retirement among forestry workers.

Nevertheless, there is clear evidence that occupational health and safety objectives in forestry work are achievable. Numerous ILO instruments recognise that occupational

safety is not merely an ethical imperative but also a safety and economic imperative. In forestry, it is also a prerequisite for sound environmental management and the sustainable use of natural resources.

It is therefore significant that governments, companies, employers' organisations, and workers' organisations are willing to take action in this area.

The provisions applicable to workers' health and safety within companies call for the establishment of an occupational health and safety policy. Occupational health and safety management should be regarded as a high-priority responsibility for wood processing industries in Central Africa.

The management of a company engaged in wood processing activities should be fully aware of its responsibilities in this area and actively promote occupational health and safety.

To ensure effective occupational health and safety management, all companies should, in consultation with the workers concerned, develop, publish, and implement a policy clearly describing the nature of the risks associated with their wood processing activities and the measures they intend to adopt to prevent or reduce the consequences of those risks and occupational accidents.

Occupational health and safety policies and their related strategic objectives should be given the same importance as other company policies and objectives. They should be explicit, practical, and suitable for monitoring and evaluation.

Companies should be committed to complying with, or exceeding, all applicable legal and regulatory requirements. Their occupational health and safety policies should be consistent with the company's general policy, regularly reviewed, and designed to ensure the full integration of health and safety considerations into the company's overall organisation and activities.

The scope and specific nature of an occupational health and safety policy will depend on the size and field of activity of the company. However, certain essential components should be included, particularly staff recruitment and training and the identification of staff members entrusted with specific health and safety responsibilities.

The names or positions of these individuals, together with the precise nature of their responsibilities, should be clearly specified. The objective should be to eliminate ambiguity and demonstrate management's commitment at every level of the organisational hierarchy, regardless of the company's size and structure.

Measures should also be taken to ensure that staff possess the required skills and have sufficient authority and resources to perform their duties effectively.

Regardless of the company's size and organisational structure, senior managers should be appointed to develop, monitor, and control occupational health and safety standards. They should serve as central points for communicating problems, including the recording and reporting of occupational accidents and diseases.

At the various levels of the hierarchy, managers should be responsible for health and safety matters. These issues should form part of their general responsibilities and be explicitly included in job descriptions as management duties.

In companies that have introduced periodic performance assessments, occupational health and safety results should be reviewed in the same manner as other aspects of professional objectives.

Health and safety measures require teamwork. Operations managers, supervisors, and operational staff should therefore regularly examine existing or potential problems. The emphasis should be placed on developing concrete and effective preventive measures rather than debating problems only after a serious incident has occurred.

➤ *Risk Identification and Management*

Employers should establish and implement procedures to systematically identify occupational health and safety risks that may affect forestry activities or result from them.

The identification process should include hazards and risks that cause, or could cause, occupational accidents and diseases, incidents, and emergency situations.

A risk assessment should be conducted for each task and activity. Every risk should be identified and recorded.

Procedures should be established to assess risks and the effects of hazards using appropriate screening criteria, taking into consideration both the frequency with which such risks may materialise and the likely severity of their consequences for occupational health and safety.

Based on the results of risk assessments, companies should establish objectives aimed at reducing these risks as much as possible and should design and implement appropriate preventive measures.

III. USE OF PERSONAL PROTECTIVE EQUIPMENT

Occupational health and safety measures in forestry and wood processing activities should include systematic inspections and adequate preparation within forestry industries, as well as the implementation of the principles of work organisation set out in this article.

Representatives responsible for occupational health and safety management should be given the authority and responsibility necessary to coordinate, implement, and maintain health and safety strategies. This does not in any

way diminish the responsibilities of company managers regarding occupational health and safety issues.

Although work supervision must be regarded as essential for achieving occupational health and safety objectives, workers' motivation to comply with safety rules is equally crucial for preventing accidents and health risks.

Such motivation should be strengthened through appropriate measures designed and implemented by operations managers and supervisors. Most of these measures should include timely information concerning the company's economic and safety objectives, training and education, and incentive bonuses.

Rather than relying on punitive sanctions, companies should encourage safe behaviour by recognising and financially rewarding workers who comply with safety requirements.

Health and safety committees should be established wherever possible. They should consist of workers or their representatives, employer representatives, and, whenever possible, a qualified physician.

Health and safety committees should meet regularly and participate in decision-making processes concerning work, health, and safety issues.

Company-level procedures should be implemented to ensure that contractors hired by the company or working on company premises comply with its occupational health and safety objectives and requirements. Such procedures should facilitate coordination between the activities of contractors, the company, and other contractors.

When employees are first recruited, orientation sessions should be compulsory for all workers and should include the provision of appropriate PPE.

Safety meetings should be held at least once a week and whenever a worker is assigned a new task.

Procedures should also be implemented to verify workers' competence. In this respect, aptitude tests constitute a reliable and valid technique.

Employers should establish procedures designed to ensure and strengthen staff competence by identifying training needs and providing appropriate training to all workers.

Training needs can be accurately anticipated when work programmes and budgets are being prepared.

➤ *Allocation of Resources*

Adequate resources should be allocated to ensure the effective implementation and management of occupational health and safety measures.

Supervisors and workers should be encouraged to draw attention to any perceived shortcomings relating to communication and information in occupational health and safety management.

Employers and anyone using the services of a contractor should develop and implement procedures to ensure that workers, contractors, and self-employed workers are informed of:

- The need to comply with company policies and strategies and fulfil their respective roles and responsibilities;
- The consequences that deviations from prescribed standards may have for health and safety;
- The procedures to follow when proposing improvements to occupational health and safety strategies.

Employers should provide workers with adequate information concerning all identified health and safety risks associated with their activities.

Contractors should receive sufficient information concerning safety objectives and the standards applicable to forestry worksites in the region in which they operate.

Information should be provided to workers and contractors in a language they understand. Special measures may be required when individuals working within a company speak different languages.

To ensure that occupational health and safety issues are fully taken into account in forestry activities, general codes of practice or implementation manuals should include health and safety regulations and instructions alongside provisions concerning quality, productivity, the environment, and other operational aspects.

A high staff turnover rate may increase operating costs and accident risks. Companies should therefore encourage low staff turnover.

Working hours should not exceed the limits established by national legislation or collective agreements where such agreements exist. The ILO Recommendation concerning the reduction of hours of work should serve as a guide for improving occupational health and safety.

Working hours should be organised to provide adequate rest periods, including:

- Short breaks during working hours;
- Sufficiently long meal breaks;
- Rest periods during the day or night;
- A weekly rest period.

Particularly in the case of physically demanding work, employees should be encouraged to take short breaks during working hours to recover their concentration and physical fitness.

It would be highly desirable for the duration and frequency of breaks and rest periods to be prescribed by legislation, regulations, or collective agreements.

Where shift work and night work involve excessive hazards, such activities should be kept to a minimum. When night work is necessary, lighting and other occupational health and safety conditions should be organised so that the risks are no greater than those associated with daytime activities.

Achieving the occupational health and safety objectives described in this article requires the effective participation of workers. Workers should therefore be assigned only to tasks for which they are competent.

Pregnant women should perform only light duties and should under no circumstances be required to lift or carry heavy loads. They should also avoid contact with hazardous chemical substances.

Children who are still of compulsory school age or under the age of fifteen must under no circumstances be recruited.

Persons under eighteen years of age should not be assigned tasks that have been assessed, in consultation with employers, workers, and their relevant organisations, as likely to endanger the health and safety of young people.

Alcohol or drug consumption can have a negative impact on occupational safety. Any person whose normal ability to perform their duties has been impaired should be excluded from the workplace.

Each company should develop a policy for addressing alcohol and drug-related issues in the workplace. Guidance in this area is provided in the International Labour Office's *Management of Alcohol- and Drug-related Issues in the Workplace: An ILO Code of Practice*.

All activities should be carefully planned and organised in advance to avoid inefficient working practices and to ensure satisfactory control over safety practices and the progress of operations.

Work planning and organisation should be based on a forest management plan specifying:

- The types of work required;
- The objectives of the work;
- The location of designated worksites;
- The schedule for specific activities;
- The characteristics of the products and expected results;
- A description of the working methods to be used;
- The person responsible for managing and supervising the work;
- A contingency plan in the event of bad weather or equipment problems.

For each task, the safest and most appropriate method should be selected. Standardised and approved methods should be used.

Whenever possible, manual work, whether performed with or without hand-held power tools, should be assisted by machinery, particularly to minimise the lifting and manual transport of heavy loads and to reduce the risks associated with the use of portable powered machinery.

Infrastructure requirements should be assessed before work begins, taking into account the selected location, traffic possibilities on roads and tracks, and the need for additional facilities.

These requirements should be considered in relation to the means of transport used for personnel, materials, and products.

Emergency evacuation routes and procedures should be carefully planned.

The locations of shelters and storage facilities for tools, equipment, and materials should be determined in advance in order to reduce workload and increase productivity by avoiding the exhausting transport of heavy loads over long distances.

Appropriate means of transport to and from worksites should be provided for personnel, tools, equipment, and materials, and these means of transport should be properly maintained.

The direction in which operations will progress and the routes to be used for transport should be defined and marked on the ground before operations begin.

Sufficiently detailed maps of the operational area are essential for proper work planning.

Before work begins on a new project, a person designated by management should conduct a risk assessment to identify all characteristics likely to affect occupational health and safety.

Both natural hazards and risks resulting from human activities should be identified.

The risk assessment should take particular account of:

- The topography of the terrain;
- The working methods and equipment to be used;
- Dangerous trees, including toxic trees and dead or decaying standing trees, as well as other site-related hazards;
- Consultation with responsible persons concerning living or dead standing trees that can safely be retained as natural habitats;
- Electricity or telephone lines;
- Roads;

- Hiking trails;
- Other infrastructure.

Whenever possible, identified hazards should be shown on a map of the worksite and marked on the ground, for example by means of tape or barriers.

➤ *General Provisions*

The duties and responsibilities of workers and supervisors should be clearly defined.

Workers should receive clear instructions, in writing where appropriate and orally in all cases. Such instructions should include:

- A description of the tasks;
- The location of the worksite;
- The tools and machinery required;
- Identified risks and applicable safety rules;
- The personal protective equipment required;
- Information concerning rescue procedures in the event of an accident requiring evacuation;
- The need to coordinate activities with other workers, including contractors.

Working methods, tools, and equipment should be safe and comply with ergonomic principles.

Where several working methods are available, the method involving the lowest occupational health and safety risks should be selected.

To reduce the amount of time workers spend in uncomfortable positions and to reduce the workload associated with certain tasks, workers should be encouraged to rotate tasks among members of their teams.

Such arrangements may be supported through multi-task training and appropriate organisational measures.

No person should be required to work in a location so isolated that it would be impossible to call for assistance in an emergency.

When forestry workers are required to operate in isolated locations, they should remain connected to their base or supervisors through reliable means of communication.



Fig 2 Examples of Useful PPE in Wood Processing Industries

➤ *Earplugs*



Fig 3 Earplugs

➤ *Hearing Protection Earmuffs*



Fig 4 Hearing Protection Earmuffs

➤ *Safety Gloves*



Fig 5 Safety Gloves

➤ *Safety Footwear Compliant with Applicable Standards*



Fig 6 Safety Footwear Compliant with Applicable Standards

After presenting some examples of PPE recommended for wood processing industries, it should be emphasised that safety meetings and regular contact must be maintained throughout the working day, including at the end of the day.

If scheduled contact does not occur, search and rescue operations should be launched immediately.

For any operation involving logging, extraction, or loading activities, teams should consist of at least two workers who can maintain visual or verbal contact with each other.

An exception may be made for workers equipped with two-way radios, mobile phones, or other effective means of communication.

Before work begins, employers should gather workers together to inform them of the results of the risk assessment and provide instructions on how to address the identified hazards.

Ongoing work should be supervised by a trained and competent person in accordance with applicable regulations.

If an activity becomes dangerous because of adverse weather conditions or darkness, work should be suspended until conditions improve sufficiently to allow safe operations.

When working in darkness cannot be avoided, the worksite should be adequately illuminated to maintain normal safety conditions.

In the event of an unforeseen hazard, or when a task cannot be carried out using safe methods such as those described in the following sections, work should be stopped and the competent supervisor consulted regarding the appropriate course of action.

When several teams, contractors, or self-employed workers operate on the same worksite, arrangements must be made to ensure coordination and to allocate and communicate supervisory responsibilities.

For any activity that threatens the safety of visitors, including members of the general public, access to the worksite must be prohibited and warning signs should be displayed, for example: “Danger – Tree Felling” or “No Entry – Forestry Operations.”

When hazardous activities are carried out alongside public roads, the road should be closed over a reasonable distance for the duration of the work.

The length of the closed section should be agreed in advance with the relevant road administration or police authorities.

➤ *Protection Against Adverse Weather Conditions and Biological Hazards*

Forestry activities are generally conducted under circumstances that expose workers to adverse weather conditions and biological hazards.

Particular Attention should therefore be Paid to:

- Preventing heat-related illnesses;
- Protecting workers against excessive exposure to ultraviolet radiation;
- Protecting workers against weather or climatic conditions likely to cause injuries or illnesses, such as rain, lightning, snow, and low temperatures;
- Reducing, as far as possible, discomfort caused by insect bites.

Workers should be able to recognise the symptoms of heat-related illnesses and know how to respond appropriately.

To prevent heat-related illnesses, a working regime should be established and maintained that allows workers to rest in adequately shaded areas.

Workers should be provided with suitable clothing that effectively protects the body and head against difficult climatic conditions, in accordance with national and international standards.

Cotton work clothing is generally suitable for work in tropical climates or very hot weather.

However, it should be noted that in tropical and subtropical regions, ordinary cotton shirts and T-shirts may not provide sufficient protection against ultraviolet radiation, and sunscreen may therefore be required as additional protection.

Where circumstances require it, workers should be provided with effective insecticides or insect repellents.

When selecting and using insecticides, however, it should be recognised that prolonged application of such substances may cause serious irritation to the skin and eyes, particularly when combined with intense sunlight.

Whenever possible, work should be performed when climatic conditions are most favourable to workers.

The season of the year and daily working schedules can significantly reduce the amount of time workers are excessively exposed to sunlight, extreme temperatures, and heavy rainfall.

IV. RESULTS

During wood processing operations, workers may experience substantial static loads on the shoulders and arms, together with unfavourable neck positions.

This working method should be avoided, particularly when pruning large branches. To avoid highly uncomfortable positions, the use of a ladder is preferable.

When workers must climb a tree to a height exceeding three metres, they should use equipment that minimises the risk of falling and enables an optimal working position.

➤ *Equipment*

Tools should be selected according to the height of the branches to be cut.

Tools should be designed, manufactured, and maintained in accordance with applicable requirements.

It should be recognised that different tree species require different saw-tooth configurations, which can help minimise workload and increase productivity.

Tool cutting edges should be kept sharp and clean.

The following equipment should be readily available at the worksite:

- Spare blades, a spare handle, and fastening components such as screws, bolts, and rivets;
- Appropriate files for sharpening blades;
- Tools for changing blades;
- Solvent for cleaning blades;
- A blade guard for transport.

When working from the ground, pruners should wear a safety helmet and eye protection.

Pruners should wear personal protective equipment complying with the applicable requirements.

Footwear should have non-slip soles providing adequate grip both on the ground and on ladder rungs.

Ladders should be made of lightweight material and provide adequate stability. The rungs should be evenly spaced.

The ladder should either be equipped with a device enabling it to be securely attached to the tree or should be positioned so that the distance between the base of the ladder and the foot of the tree against which it rests is equal to one-quarter of the height to which the worker will climb.

➤ *Workers should:*

- Maintain a safe distance from other persons;
- Ensure that the working area is sufficiently clear so as not to interfere with sawing operations;
- Remain sufficiently far away from areas where branches and other debris are likely to fall;
- Carry tools in accordance with safety instructions and keep blades covered by protective sheaths during transportation.

Harvesting operations should be planned well in advance to ensure efficiency and appropriate organisation and supervision.

This is particularly important in locations requiring preparatory work such as the organisation and construction of extraction routes.

When selecting working methods and equipment, those responsible for planning should take into consideration the limitations imposed on machinery by the gradient of slopes.

Work organisation should also take into account the possibility of unexpected difficulties.

Equipment required to safely release hung-up trees should always be available on or near the worksite.

A detailed transport plan should be prepared indicating:

- The volume of timber to be harvested;
- The characteristics of the products and volumes by assortment;
- The machinery to be used for extraction, such as skidders, tractors, or cable cranes;
- The direction of extraction routes and the location of storage areas and roadside stacking sites.

All extraction routes and corresponding catchment areas should be clearly marked on maps and within the forest.

In tropical forests or other areas where work preparation requires decisions concerning individual trees, the approximate direction of fall should be determined for every tree to be felled and marked on the tree, using the extraction plan as a guide.

Dead or decaying standing trees are particularly dangerous because branches may fall and such trees may collapse in any direction.

They should be felled by highly qualified personnel, preferably before the worksite is opened, using machinery or other recognised safe methods.

If this operation must be performed using hand-held power tools, work organisation, including possible remuneration arrangements, should ensure that safety is given priority.

No felling, cross-cutting, or delimbing operation should be undertaken in an area rendered dangerous by a leaning dead tree or a tree that has been struck by a felled tree until the hazardous tree itself has been safely felled.

Throughout operations, the worksite should be kept as clear as possible.

It should be large enough to allow machine operators to retreat rapidly and safely in an emergency.

Work should be organised so as to minimise the manual handling of timber.

In this regard, it is important to carefully plan the direction of tree felling according to the topography and extraction routes.

Whenever possible, machinery should be used during manual or chainsaw felling operations, particularly to minimise the lifting and transport of heavy loads and reduce the risks associated with hung-up trees.

➤ *Felling and Processing*

• *Manual and Chainsaw Felling: Organisation*

When selecting the direction of fall, the extraction method and extraction route play an important role because both safety and productivity depend largely on the position of the logs in relation to skidding routes.

Felling sites should be divided into cutting areas clearly allocated to the workers involved in felling operations so that no two groups of loggers work at a distance of less than twice the length of the tallest tree to be felled.

Cutting areas should preferably be marked within the stand, for example by painting arrows on boundary trees.

No person should approach a logger within a distance equivalent to twice the length of the tree being felled unless the logger has confirmed that it is safe to do so.

Under no circumstances should any person other than the logger remain near the base of a tree being felled, except in the following circumstances:

- Assisting with the direction of the tree's fall;
- Management supervision;
- Training as an apprentice logger;
- Providing assistance in the event of a particular felling difficulty, provided that the logger agrees that the operation can be performed safely.

Particular attention is required when work is performed on sloping terrain.

Where the slope is steep, workers should not be permitted to work immediately below other workers.

Operations should be organised so that workers cannot be struck by rolling or sliding materials.

• *Equipment*

Depending on the diameter of the tree to be felled, workers should be provided with:

- ✓ A hand saw of an appropriate size and design;
- ✓ A sufficiently powerful chainsaw equipped with a guide bar of adequate length.

The lightest possible saw combined with the shortest possible guide bar generally provides a good ergonomic solution.

Except for very small trees—for example, trees less than ten centimeters in diameter—the use of an axe for felling should be avoided because it makes the direction of fall difficult to control.

Moreover, the workload and quantity of timber lost during felling are significantly greater when an axe is used than when a saw is used.

V. DISCUSSION

When felling trees in old-growth stands or natural forests, particular attention should be paid to tangled branches, vines, and dead trees.

Only persons responsible for felling, cutting, or delimbing should be permitted to enter the working area.

Before entering the working area, any other person should inform the operators of their intention and obtain confirmation that there is no safety problem.

Workers should be encouraged to request assistance whenever they do not feel competent to deal with specific felling difficulties.

Before beginning to fell a tree, workers should ensure that no unauthorised person is present within the felling area.

The minimum safety distance should be at least twice the height of the tree being felled.

Escape routes should be selected in advance and kept free of undergrowth, tools, and other obstacles that could prevent workers from escaping rapidly.

The base of the tree should be free from obstacles, and loggers should ensure that they can work from a stable position.

The felling cut should be made sufficiently high above the highest ground level to enable the logger to make the notch safely, control the direction of fall, and retain sufficient freedom of movement to move away from the stump as soon as the tree begins to fall.

As a general rule, trees should be cut as close to the ground as working conditions safely permit.

Any felling technique recognised as safe by a competent authority or training organisation may be used.

In addition to such techniques, or where no technique has officially been recognised as safe, the following procedure is recommended for felling trees whose diameter

is less than twice the effective length of the chainsaw guide bar:

- Reduce buttresses where necessary to obtain a more or less cylindrical base and thereby improve control over the direction of fall;
- Make a directional notch at an angle of ninety degrees to the intended direction of fall, to a depth of between one-fifth and one-quarter of the tree's diameter. The vertical and horizontal cuts of the notch should meet exactly. Cuts extending too far may weaken the hinge;
- Make the main felling cut slightly higher than the directional notch, leaving a hinge approximately one-tenth of the tree's diameter. This hinge is essential for directing the tree's fall along the intended path.

For large trees, wedges or a lever should be inserted into the felling cut to prevent the tree from leaning backwards or trapping the saw and to help push the tree in the intended direction of fall.

The purpose of this article is to contribute to protecting workers against the occupational health and safety hazards associated with forestry and wood processing activities and to help eliminate or reduce the incidence of occupational diseases and injuries.

To achieve this objective, the article provides practical guidance concerning:

- The key elements of occupational health and safety policies and procedures at national, company, and worker levels, enabling minimum requirements to be effectively communicated to all stakeholders and supporting the preparation and organisation of work;
- The establishment of consultation and cooperation structures for occupational health, safety, and welfare involving those who create risks, those subsequently exposed to those risks, and the organisations responsible for reviewing and enforcing regulations and standards;
- The principal requirements governing forestry operations in order to minimise the risks of injury and disease;
- A system for recording, reporting, and monitoring occupational accidents and diseases and unsafe working conditions, which can be used to measure compliance with requirements and/or the effectiveness of measures already implemented to improve occupational health and safety conditions;
- A framework for sharing responsibilities among the various organisations and individuals who collectively contribute to developing a positive attitude towards occupational health and safety and ensuring that health and safety are given the same level of importance as other operational objectives and factors.

The objective is therefore to contribute to protecting workers against the health and safety hazards associated with forestry activities and to help eliminate or reduce the incidence of occupational diseases and injuries.

➤ *Legal Framework and Obligations of Competent Authorities*

Competent authorities should design and implement a national policy and adopt legislation or regulations capable of ensuring the occupational health and safety of workers engaged in forestry activities and protecting persons present on or near forestry worksites against all risks arising from occupational activities.

National occupational health and safety policies and legislation should be developed in consultation with recognised employers' and workers' organisations.

Legislation and regulations should be sufficiently flexible and should be reviewed at appropriate intervals to facilitate adaptation to technological developments and new circumstances and standards.

One means of ensuring such flexibility is to define protection objectives rather than prescribe specific preventive measures.

To prevent the establishment of two separate sets of standards, company-level inspections should apply equally to company employees and contractors.

All staff members should be informed of the sanctions applicable in cases of negligence.

➤ *Responsibilities and Obligations of Employers*

Employers bear primary responsibility for occupational health and safety within the company.

They should make every possible effort to minimise risks on or near forestry worksites.

Employers should comply with all applicable occupational health and safety laws, regulations, and codes of practice.

Where legislation and regulations do not exist, employers should develop and implement their own appropriate requirements.

Employers should promote and maintain a safety culture within the company, including systems of moral and material recognition and incentive bonuses for all staff members involved.

Whenever possible, employers should establish committees composed of worker and management representatives or adopt other suitable arrangements to enable workers to participate actively in promoting safe working conditions.

Employers should establish and maintain an occupational health and safety policy together with an appropriate company-level management system.

Workers are exposed to cuts, crushing injuries, and intense noise during wood processing operations.

Many workers consider PPE such as gloves, masks, and helmets uncomfortable or unsuitable for hot climatic conditions.

Financial constraints sometimes limit investment in occupational safety.

Safety training therefore needs to be improved in order to prevent accidents.

The use of PPE is the most common preventive measure, although it is often ineffective because workers do not use the equipment consistently.

Some companies implement strict safety policies, including PPE distribution and worker training.

Occupational risk assessment consists of identifying, recording, analysing, and evaluating risks in order to determine the most appropriate preventive actions.

Such assessments should also take into account the fact that exposure to occupational risks may have different effects depending on the sex of the employee.

VI. CONCLUSION

Beyond the regulatory obligation imposed on employers, occupational risk assessment constitutes one of the principal means of improving the overall quality and performance of a company.

Indeed, it can contribute to improving company operations throughout the organisation's development, not only by strengthening control over known risks but also by identifying emerging risks with delayed effects or new risks, particularly those associated with new forms of work organisation, such as the increasing use of fixed-term contracts, temporary employment, just-in-time production systems, or new industrial processes.

Employee health and safety should therefore not be separated from the general functioning of the company, including technical choices, work organisation, skills mobilisation, and training.

Occupational risk assessments should be carried out at least once a year in companies employing at least eleven workers and, at a minimum, whenever a change occurs that is likely to affect employees' health and safety.

Assessments may also be carried out on an occasional or systematic basis before certain operations or following an occupational accident.

Several techniques, tools, guidelines, and practical instructions are available. However, employers should select the method best suited to the size and culture of their company and the nature of its activities.

Internal occupational risk assessment should be prioritised. Such autonomy enables company managers to:

- Retain control over decisions intended to manage risks;
- Contribute to the appropriation of the risk-management approach by management and employees.

Nevertheless, employers may rely on external assistance.

Employees are the person most directly affected by the occupational risks to which they are exposed.

The identification and assessment of risks, as well as proposed preventive measures, should therefore be discussed with employee representative bodies or directly with employees in companies where such representative bodies do not exist.

Occupational risk assessment is, above all, useful for the company itself. It leads to the selection of appropriate preventive actions.

Based on risk identification and assessment, and after consultation with employee representative bodies, the preventive measures decided upon under the responsibility of the company manager should contribute to the development of the Annual Prevention Plan (APP) or the company's Health, Safety and Environment Plan (HSE Plan), consolidated within a single risk assessment document.

Problem-solving groups may be established for this purpose.

Preventive actions should be selected by giving priority to measures that comply with the nine general principles of prevention.

➤ *The Bird Accident Pyramid*

The Bird Pyramid was developed by Frank E. Bird following a study conducted by the Insurance Company of North America in 1969.

The study examined 1,753,498 accidents reported by 297 companies. These companies represented twenty-one different industrial groups and employed approximately 1,750,000 people, who accumulated three billion hours of work during the period studied.

The principle underlying Bird's Pyramid is that the probability of a serious accident occurring increases with the number of near misses and incidents.

Consequently, if a company succeeds in reducing the number of incidents at the base of the pyramid, the number of serious accidents should also decrease.

The version currently used as a preventive management tool therefore assumes a relatively constant relationship between events of different levels of severity,

while adding an even broader base of “unsafe behaviours,” which are, by definition, difficult to quantify because they are generally undocumented.

Considerable criticism may nevertheless be directed at the almost unquestioning confidence that managers and prevention specialists sometimes place in this dated representation of events whose definitions have evolved and which originated in a North American industrial environment.

Once again, looking backwards may determine preventive practices that are reassuring but potentially unsuitable or ineffective.

Such reliance may amount to a belief that is particularly difficult to challenge because it is often perceived as established doctrine.

Based on this representation, the commonly accepted approach consists of giving priority to the least serious events in the hope of completely eliminating the most serious ones, or of addressing “unsafe behaviours” in order to prevent fatal accidents.

However, prevention requires a more rigorous protocol. The most serious accidents may also occur among highly rated and attentive employees whose behaviour appears exemplary.

Finally, the nature of the events reported varies to such an extent that the original meaning of Bird’s statistical analysis may be lost.

Nevertheless, efforts to examine and use Bird’s Pyramid remain significant, particularly in the fields of managerial culture and prevention, since simplified representations can be attractive and reassuring.

It must therefore be acknowledged that accidents in wood processing and forestry industries remain a highly topical and serious concern in Central Africa, where employers in these sectors may sometimes prioritise economic gains at the expense of the health and safety of their employees.

Governments should therefore take occupational and industrial safety much more seriously and strengthen enforcement against company managers in general, and managers of wood processing and forestry companies in particular, notably through the imposition of recognised international safety certifications.

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