



CLIMATE CHANGE AND FOREST RESOURCES MANAGEMENT: THE WAY FORWARD



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Ergonomic assessments of forestry operations in omo forest reserve, Ogun state, Nigeria.



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Abstract

Research has been intensified in finding ways of improving tree quality, soil conservation, planting and fertilizing techniques and all other factors affecting tree but man who makes success possible for the forest industry, has received far less attention. It is in view of the above that this study assessed the working environment of a logging crew and saw mill workers in Omo Forest Reserve, Ogun State, Nigeria. 42% of the work force reported that the tools and equipments had effects on their working efficiency. All the workers were exposed to noise but only 58% asserted that the noise affected their working efficiency and health. Despite their observations, none of the workers interviewed had ever gone for an auditory test and do not use protective equipment such as ear gear because they were not provided with one. An evaluation of the workers' assessment of their living condition revealed that 42% felt that it was good, 33% very good, 17% excellent and 8% stated that it was fair. The study revealed that the level of awareness by the workers was poor and management of the reserve did not take safety measures into consideration. The management should conduct a regular ergonomic assessment of its workforce towards ascertaining their state of health and awareness on precautionary measures and safety regulations should be strengthened. It is expedient that the management finds a way of improving the working condition and interacting regularly with the workers in order to improve their working efficiency and productivity.

Keywords: Ergonomics, working environment, working efficiency, Management, Health

Introduction

Ergonomics is a broad mix of a variety of scientific disciplines, incorporating for example, anthropometry, physiology, psychology, occupational medicine and sociology. According to Megaw (1995), it is the scientific study of the relationship between people and their working environments. The working environment refers to all conditions, circumstances and influences surrounding and affecting the worker. FEPA (1989) opined that since a considerable portion of a workers life is spent within his work environment, it is therefore, essential to ensure that environmental factors in the work place conform to generally acceptable standards to ensure optimal productivity as well as the protection of the health and safety of the worker. The environment is beyond the ambient environment of work but also their tools and materials, their methods of work and the organization of their work, either as an individual or within a working group. All these are related to the nature of the people themselves; to their abilities, capabilities and limitations. Ergonomics has two major elements which are the technical part and the human part. The technical part is also called applied ergonomics which involves the practical aspects of optimizing work places, machines, tools, etc. It is fitting the job to the worker which according to Zander (1980) is a multidisciplinary activity having to do with the work situation, its primary objective being to achieve an optimum man/ task system where a balance is obtained between the worker and the working conditions. Slack *et al* (1998) distinguishes this into two parts; how the worker interfaces with the physical aspects of his/ her work and how the worker interfaces with environmental conditions in his/ her immediate working area. The human part describes the physical, mental, psychological characteristics of man, in terms of measures and reactions, capabilities and limitations.

Forest work confronts two living subjects which are tree and man (Apud and Valdes, 1995). However, research has been intensified in finding ways of improving tree quality, soil conservation, planting and fertilizing techniques and all other factors affecting tree but man who makes success possible for the forest industry, has received far less attention. Man with his physical strength and intellectual capacity is responsible for continuity of work, he operates the equipment, controls the machines, directs work processes and coordinates activities. Forest workers play a key role in forest operations and are responsible for its success, it is thus important to ensure the adoption of all means in order to enhance satisfaction of the worker. Rosskam and Baichoo (1997) reported that the application of ergonomics principle is not only beneficial

to the worker but also to employers and are visible and measurable in terms of increased efficiency, higher productivity, reduced lost work time due to illness or injury, and decreased insurance costs.

Historically, timber harvesting was done by manual felling and buckling, these practices were characterized by the shortwood method where trees were cut into lengths which could be handled by man. Tree felling was mostly done with axes, matchets or jungle knives wielded by man with considerable brawn. In 1920, two man raker tooth saws replaced axes in felling and crosscutting operations and by the early 1960s, these were in turn replaced by power chainsaws, thus ushering in a new era in safety and ergonomics, and the problems of noise pollution and vibration (Juvelius, 1997). However, in recent times, the development of logging systems have changed considerably with emphasis on systems that are economically, ecologically and ergonomically sound. (Dykstra and Poschen, 1998).

Forest workers face a wide variety of adverse situations while performing their tasks, and in order to reduce the sources of risks and danger, ergonomic checklists have been designed to assess various aspects of the working environment. Ergonomic check lists have been successfully applied in forest work and they are designed subject to modification to suit the user. The checklist is used for gathering qualitative rather than quantitative data; the objective not being to collect sufficient data for statistical analysis, but to obtain an overview of working conditions, thus enabling the identification of unacceptable conditions. Identifying ergonomic risk factors (any imbalance between the worker and the work environment, which results in extra demands on the worker) is essential for preventing ergonomic related injuries and illnesses.

According to the Bureau of Labour Statistics (2002), the logging crew in a forest operation consist of between 4- 8 people with a typical crew consisting of one or two fellers, or one feller machine operator who uses a chain saw, one buckler who trims off the tops, branches and cut the logs into specified lengths, two tractor operators to drag the cut trees to the loading deck, one equipment operator to load logs unto trucks and choke setters who fasten chokes around the logs to be skidded by the tractors to the landing.

Despite the increased mechanization of operations and improved equipment, many logging jobs remain labour intensive, ranging from the unskilled task of manually moving logs, branches and equipment to the skilled use of chainsaws. It is in view of the above that this study assessed the working environment of a logging crew and saw mill workers in Omo Forest Reserve, Ogun State, Nigeria which lies within Latitude 6° 35" and 7°N and Longitude 4°5" and 4°40".

Materials and Methods

An ergonomic checklist comprising of information on tools and equipment, noise, safety and accidents, vibrations, sawdust, working time and working conditions was administered to each of the five (5) members of the logging crew and seven (7) members of the saw mill operators.

Checklist and Factors Considered

1. **Assessment of Tools:** (a) Frequency of use of tools and equipment (b) Effects of tools and equipment on working efficiency (c) Presence of alternative tools for same task.
2. **Assessment of Noise :** (a) Workers exposure to noise (b) Duration of noise exposure (c) Effects f noise on working efficiency (d) Effects of noise on health of the worker (e) Frequency of auditory tests (f) Use of protective measures.
3. **Assessment of Safety and Accidents:** (a) Involvement in accident (b) Presence of effect of accidents (c) Degree of fatality of the most common accident (d) Accident avoidance and (e) Awareness of safety regulations
4. **Assessment of Vibrations:** (a) Workers exposure to vibrations (b) Duration of exposure to vibration (c) Type of vibration exposed to (d) Effect of vibrations on workers' health.
5. **Assessment of Exposure to Sawdust :** (a) Level of exposure to sawdust (b) Duration of exposure to sawdust (c) Use of protective measures against sawdust (d) Ailments resulting from sawdust .
6. **Assessment of working time and conditions :** (a) Workers ability to cope with task (b) Workers satisfaction with living conditions (c) Workers perception of living condition and (d) Workers satisfaction with conditions of service.

Data Analysis

A descriptive statistical tool (frequencies and percentages) was used to present the observations from the study.

Results and Discussion

The results as shown in Table 1 revealed that the chain saw operator, the tractor operators as well as all the operators in the saw mill are skilled as they had to undergo one training or the other to be able to operate their equipment efficiently. However, the activities of the skidders are unskilled as they require energy to carry out their work.

Table 1: Position of the Worker, Tools and Equipment used

S/N	Position of the worker	Tools /Equipment used	Task carried out
1	1 Chain Saw Operator	Chainsaw	To fell trees and crosscut them into billets if necessary
2	2 Tractor Operator (1)	Tractor	To haul logs out of the forest area to the landing.
3	Tractor Operator (2)	Tractor	To haul logs out of the forest area to the landing.
4	Skidder (1)	Cutlass, winch, rope	The winch rope is tied around the log to be skidded while the cutlass is used to clear the branches along the skidding trail or to clear the road before tree felling.
5	Skidder (2)	Cutlass, winch rope	The winch rope is tied around the log to be skidded while the cutlass is used to clear the branches along the skidding trail or to clear the road before tree felling.
6	Sawmill superidentend	All machines	Supervises the worker and operates any machine if necessary
7	Operator(1)	All machine	Sawn The logs into Sawn wood
8	Operator(2)	Straight line edger	Cut the Sawnboard into required dimension
9	Operator(3)	Straight line edger	Cut the Sawnboard into required dimension
10	Operator(4)	Crosscutting machine	Trims and dimension the sawnwood into lengths
11	Operator(5)	Crosscutting machine	Trims and dimension the sawnwood into lengths
12	Operator(6)	Horizontal band saw(CD machine)	Saw the logs into sawn wood

Assessment of Tools

Table 2 shows that all the workers use their tools and equipment continuously throughout the working period. 42% of the work force i.e the chainsaw, tractor operator (2), operators (1), (2) and (6) reported that the tools and equipments had effects on their working efficiency. According to them, the most prominent effect was back pain and chest pain which leads to reduction in their speed of operation. Interestingly, 50% of the workers were not aware of the existence of alternative tools/ equipment which could make their work easier and less laborious. However, the chain saw operator stated that they were aware of the use of axe for their operations but noted that it would reduce productivity while the operators of the crosscutting machine stated that the edgers could perform the same function.

Table 2: Assessment of Tools

Check list	Options	Frequency(Logging)	Frequency (Sawmilling)	Total	%Total
A	Continuously	5	7	12	100
	Occasionally	-	-	-	
	Rarely	-	-	-	
B	Yes	2	3	5	42
	No	3	4	7	58
C	Yes	1	5	6	50
	No	4	2	6	50

All the workers reported that they were exposed to noise and all of them confirmed that the exposure to noise was throughout the operations (Table 3). The chainsaw and the tractor were stated to be the sources of the noise during logging while the sawmilling machines generated noise in the sawmills. This is in line with the report of ILO, 1992 that forestry equipment are producers of high levels of noise. The study showed that noise adversely affected the working efficiency of 58% of the workers. This is attributed to the effects of impaired communication which affected effective communication thereby causing reduction in work progress. This report agrees with Bostrand (1989) that high noise levels reduce productivity. 58% of the workers reported that the noise had impact on their health in terms of incessant headache. According to Kryter (1985), the effects are related to stress. Despite their observations, none of the workers interviewed had ever gone for an auditory test and do not use protective equipment such as ear gear because they were

not provided with one. This confirms the report of Bostrand (1989) that in some cases, the effects of noise on man are not noticeable until as much as 10- 15 years later. All the workers except the tractor operator (1) promised to use the ear protectors if provided with one.

Table 3: Assessment of Noise

Check	Option	Frequency(logging)	Frequency(sawmilling)	Total	%Total
A	Yes	5	7	12	100
	No	-	-	-	-
B	Continuously	5	7	12	100
	Occasionally	-	-	-	-
	Rarely	-	-	-	-
C	Yes	3	4	7	58
	No	2	3	5	42
D	Yes	3	4	7	58
	No	2	3	5	42
E	Yes	-	-	-	-
	No	5	7	12	100
F	Yes	-	-	-	-
	No	5	7	12	100

As shown in Table 4, 50% of the workers reported that they had suffered from work related accident at one point or the other while others stated that they had never suffered from any job accident and 100% of the workers who had suffered from work related accident before stated that their productivity was affected as they could not work while recuperating. The workers reported that the accidents were due to one form of carelessness or the other. This is in line with the report of Zander (1980) that humans at work are liable to make mistakes. An assessment of the degree of fatality of the accidents showed that none of the accidents was fatal. The logging crew had felling of branches on members of the crew as the most common accident which agrees with the report of Poschen (1993) that loose branches falling down are dangerous and can cause serious accidents. The study showed that the most common accident occurs during felling operation and this agrees with the report of Dickson, 1987 that the felling operation stage is the most hazardous in wood harvesting operation and places the chainsaw operator at a higher level of risk. However, the cracking of the saw in the CD machine was reported as the most common accident in the sawmills. According to 50% of the workers, accidents in forestry operations could be avoided by increasing the concentration on the work, use of newer equipment and protective equipment and adequate maintenance of equipments. Unexpectedly, all the workers in the logging crew were unaware of safety regulations while only three workers in the sawmill were aware of safety regulations and claimed that they obeyed the regulations. The workers suggested the provision of protective equipment such as helmets and boots.

Table 4: Assessment of Safety and Accidents

Check	Option	Frequency(logging)	Frequency(sawmilling)	Total	%Total
A	Yes	2	4	6	50
	No	3	3	6	50
B	Yes	2	4	6	100
	No	-	-	-	-
C	Fatal	-	-	-	-
	Non fatal	5	7	12	100
D	Yes	2	4	6	50
	No	3	3	6	50
E	Yes	-	3	3	25
	No	5	4	9	75

The study revealed that 83% of the workers were exposed to one form of vibration or the other and all of them reported continuous exposure while 60 % of them were exposed to Hand – Arm vibration and 40 % to Whole- Body Vibration. The chainsaw, tractor and machines in the sawmill were the sources of vibration and the adverse effects of

vibration was reported by all the workers. They reported pains in their arms and stiffness in their fingers leading to numbness. The workers felt that manufacturers of equipments should have a way of minimizing the effects of vibration.

Table 5: Assessment of Vibrations

Check list	Option	Frequency(logging)	Frequency(sawmilling)	Total	%Total
A	Yes	3	7	10	87
	No	2	-	2	17
B	Continuously	3	7	10	100
	Occasionally	-	-	-	-
	Rarely	-	-	-	-
C	Hand-arm vibration	1	5	6	60
	Whole body vibration	2	2	4	40
D	Yes	3	7	10	100
	No	-	-	-	-

83% of the workers comprising of all the sawmill workers were exposed to sawdust. The tractor operators were not exposed to sawdust. However, the duration of exposure varied. While 83% of the workers reported continuous exposure to sawdust over the working period, 17% (skidders) reported that they only experienced occasional exposure to sawdust. None of the workers used protective equipment and this was attributed to the fact that none was provided by the management.

Sawdust was reported to have caused one form of ailment or the other to 67% of the workers. These ailments were but not limited to cough, catarrh and eye irritation. In order to salvage incessant request for sick leave, the workers felt that protective equipment for the eyes, nose and throat should be provided.

Table 6: Assessment of Sawdust

Check list	Option	Frequency(logging)	Frequency(sawmilling)	Total	%Total
A	Yes	3	7	10	83
	No	2	-	2	17
B	Continuously	3	7	10	83
	Occasionally	2	-	2	17-
	Rarely	-	-	-	-
C	Hand-arm vibration	-	-	-	-
	Whole body vibration	5	7	12	100
D	Yes	4	4	8	67
	No	1	3	4	33

Both the logging crew and workers at the sawmill were exposed to the same number of working hours which was between 7: 30am and 3:30 p.m throughout the days of the week. This is however subject to change during intense activities. This is in line with ILO (1962) recommendations on working time. The workers informed that there were no official breaks during working hours, though they take breaks in between work to rest. Also there were cases of variation in the working hours due to exigencies. The management of the reserve provided accommodation for all the workers in order to ensure maximum concentration and improved productivity but only 67% of the workers were satisfied with their living conditions while 33% reported that the sanitary conditions in the camp was in a deplorable state. An evaluation of the workers' assessment of their living condition revealed that 42% felt that it was good, 33% very good, 17% excellent and 8% stated that it was fair. An assessment of their conditions of service revealed that 67% of the workers were not satisfied with the conditions of service while 33% were satisfied. The lower rate recorded for satisfaction was adduced to low salary payable to them since they were merged with the civil service. The workers opined that an improvement in the package would improve their morale.

Table 7: Assessment of Working Time and Conditions

Check	Option	Frequency(logging)	Frequency(sawmilling)	Total	%Total
A	Yes	5	7	12	100
	No	-	-	-	-
B	Yes	3	5	8	67
	No	2	2	4	33
C	Excellent	-	2	2	17
	Verygood	2	2	4	33
	Good	3	2	5	42
	Fair	-	1	1	8
	Bad	-	-	-	-
D	Yes	2	2	4	33
	No	3	5	8	67

Conclusion and Recommendation

From the study, it is evident that the tools being used by the workers had correlation with their productivity and the noise they are exposed to during working hours also affected the working efficiency and health of the workers. The workers were liable to accidents as a result of carelessness and this also have the potentials of greatly reducing the productivity. Generally, the workers had a low level of awareness of standard rules and safety regulations while the employers did not also provide the necessary information and protective gadgets. Though, the workers were given free accommodation and electricity but there was a deplorable sanitary condition.

Based on the findings, it is advisable that the management of the forest reserve conducts a regular ergonomic assessment of its workforce towards ascertaining their state, awareness on precautionary measures and safety regulations. It is expedient that the management finds a way of improving the working condition and interacting regularly with the workers in order to improve their productivity.

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