

# Occupational health and safety conditions of wood industry workers in southern Brazil



**ANDRADE, Luis Renato Balbão**  
FUNDACENTRO/ Porto Alegre, RS, Brazil/  
[luis.andrade@fundacentro.gov.br](mailto:luis.andrade@fundacentro.gov.br)



**FRANZ, Luis Antonio dos Santos**  
Product Engineering Departement/ Federal University of Rio Grande do Sul/ Porto Alegre, RS, Brazil/  
[luisantoniofranz@yahoo.com.br](mailto:luisantoniofranz@yahoo.com.br)



**CUNHA, Cristiane Paim da**  
FUNDACENTRO/ Porto Alegre, RS, Brazil/  
[cristiane.cunha@fundacentro.gov.br](mailto:cristiane.cunha@fundacentro.gov.br)



**AMARAL, Fernando Gonçalves**  
Product Engineering Departement/ Federal University of Rio Grande do Sul/ Porto Alegre, RS, Brazil/  
[amaral@producao.ufrgs.br](mailto:amaral@producao.ufrgs.br)

## ABSTRACT

Improvement of working conditions in the field of Occupational Health and Safety (OHS) is a key issue and subject of scientific studies and governmental actions in Brazil. Despite all efforts already taken some economic sectors still reveal improvement opportunities. This can be illustrated by the wood production chain in the mid-south region of the State of Rio Grande do Sul, where rudimentary methods for eucalypt harvesting, transporting and handling are applied. By means of a qualitative research this study aims at identifying working conditions on that region within that specific economic activity. A field research was conducted in order to find out the views of land owners, employees and OHS specialists concerning those conditions. Among surveyed individuals misleading and a conflicting positions were found which were later compared with the findings of governmental official sources. Our study is part of a broader research project jointly carried out by two Brazilian institutions, namely, Federal University of Rio Grande do Sul (UFRGS) and FUNDACENTRO, Foundation on Occupational Safety and Health Researches and Studies of the Ministry of Labor & Employment. Based on our findings the project's main purpose is to propose practical solutions that are suitable to the socio-economic context and can lead to the improvement of working conditions within that particular productive chain.

Keywords: wood production chain, eucalypt handling, working conditions

## INTRODUCTION

The forestry productive sector holds globally great economic importance. This evidence can be seen in the pulp and paper, where there was in 2008, forecasts of robust growth in global demand, special in companies of foreign capital [18]. In Brazilian context, this scenario repeats itself, and, according to the Brazilian Association of Planted Forest Producers (ABRAF), for example, areas of planted forests in the country have accumulated in 2008 an estimated 6,126,000 hectares of eucalyptus and pine. This total represented an increase nearby 282,000 hectares planted in relation to total estimated last year. It was also a growth of

7.3% in eucalyptus planted area and fall 0.4% in pine, which resulted in an increase of 4.38% of forests planted area accumulated by 2008 compared to 2007 [1]. In the particular case of Rio Grande do Sul, forecasts settled in 2008 indicate that forest enterprises associated to the production of pulp and paper could add about U\$ 2 million annually in tax collection services for the municipalities involved, besides the increase Regional GDP at 3.5% and the number of jobs, culminating in approximately 3300 vacancies at the end of seven years between direct and indirect jobs [11].

Despite the economic growth registered in the productive forest sector, in other less fortunate points this production including the cutting of eucalyptus trees for the construction industry, the historical background is less favorable, particularly as concerns the conditions of Occupational Health and Safety (OHS). For example, in a study of logging in the state of Mato Grosso, there has been a precarious situation of working conditions, for example, episodes of painful calluses on the hands, allergies, cases of mutilation, among other ailments [13]. Besides these problems, it can still be found in this supply chain demands for improvements in relation to socioeconomic conditions of the involved people. In this sense, the workers' profile denotes a low level of schooling, male predominance and problems related to alcoholism [17, 8]. Nevertheless, several sources of risk can still be found, especially concerning to excessive noise exposure, poor lighting, insecure protective collective and individual devices or unused [17, 10].

Considering the specific case of timber from the central region of Rio Grande do Sul, it is perceived among other things, the lack of technology, the low rate of forests replacement, and the lack of data to assist in taking decision actions to make improvements in the sector [19]. The precarious working conditions found in the region is contrary as recommended by OSHA [12] for the employees' protection of small and medium enterprises related to forestry, especially in regard to physical protection relating to workers' exposure to accidents and cuts, amputations or electric shock. Such evidence points to the need of a study aiming to identify the landscape of working conditions in this region and the critical points that could be possibly the focus of studies aimed at implementing the improvements. Finally, a study to understand and propose solutions to Occupational Health and Safety (OHS) for the forests supply chain.

The goal of this article is to identify, through a qualitative research, the perceptions of sawmill workers in south central Rio Grande do Sul and the experts in the field of SSO, concerning the work safety and health, and to identify erroneous or conflicting positions between the research participants. This study is part of a project established between government institutions (Federal University of Rio Grande do Sul – UFRGS and Fundacentro – Ministry of Labor and Employment, aiming to offer practical and appropriate solutions to the socioeconomic context for the wood production chain in the state of Rio Grande do Sul.

## **METODOLOGICAL PROCEDURES**

We performed a qualitative research as proposed by Ribeiro and Nodari [15]. To this end, we used two survey instruments (questionnaires), the first one presenting opened questions and the second containing objective questions. Both instruments were used by compiling information in field, through visits and interviews with people involved in forestry.

The sample consisted on two enterprises in Cerro Grande do Sul city, of a total 30 companies registered and operating in the city, i.e., corresponding to 6.7% of potential respondents. The companies chosen work basically with boards and battens production, using native eucalyptus wood around the city. The municipal district object of this study migrated from pottery to the activities of sawmill. This migration led to a paradoxical situation where the incorporation of a new activity,

while it provided new sources of income and employment, enabling the diversification of production, is associated with the onset of health and safety problems involved which, however, are not easily diagnosed by the interviewees.

It should be remarked that the municipality received a control action by the Regional Superintendence of Labor at the end of 2008, which issued a collective notice to the entire sector entrepreneurs of the city. In each of these companies, which are characterized by familiar enterprises presenting only two hierarchical levels, the owner and one of its employees were interviewed. As companies employ an average of 5 workers, the sample is equivalent to 20% of the total population of potential respondents in each company. In addition to the participants cited above an expert participation was included to answer the same questionnaires mentioned to the employer and the employees, however, in this case to identify the technical point of view.

The first research instrument (Table 1) applied to employers, employees and the expert presented 8 constructs, which were subdivided in 17 questions. It should be noted that in the case of the expert, the questionnaire was fulfilled autonomously, while the other participants answered the questions asked by the interviewers.

<b>Construct Issues</b>	<b>Questions</b>
Perception risk and Safety	1. Do you consider your job safe? Why?
	2. What is the biggest problem in relation to safety? What should be done to solve? What are the main sources of risk?
	3. What is most important than good security on your work? What is less important?
	4. What is missing to improve better working conditions?
Accidents	5. Have you ever been injured in this company? And in this activity? How was it? Did you receive support? In what way?
Environment	6. His work affects the neighborhood and/or the environment? In what way?
Training	7. Have you received any safety training? (In this or another company)?
	8. Have you ever done or receive any training related to their work or just learned in practice with more experienced? Which?
PPE e CPE	9. Does CPE (Collective Protection Equipment) exist in the company? Did you receive any PPE (Personal Protective Equipment)? Which one? Did any training was conducted for the use of this equipment? How is the maintenance / replacement?
	10. Do you use PPE? Failing to do so, what happens? Why do you use or not EPI?
Machinery and Equipment	11. How it is maintained machinery and equipment? When this happens?
Disease	12. Do you believe that your work will damage your health? In what way?
Satisfaction	13. Is there any performance indicator which you receive some indemnity?
	14. Are you happy about your work (the work is nice)? What are your expectations for the future?
	15. What is the main charge in relation to work? What is your main complaint about the work?
	16. If you had the opportunity to change jobs, would you change?
Final Question	17. At this point, to finish, do you have something else to add about the risks and safety in your work development?

Table 1 – Questions used in the open questionnaire

Data obtained from the open questionnaire was analyzed, using techniques of content analysis as proposed by Bardin [2]. Content analysis is a methodology that makes use of communication techniques in order to obtain, through systematic and objective procedures, the description of the messages content generating indicators (quantitative or not). These should allow knowledge generation of the production conditions / reception (inferred variables) of these messages [2]. In this study, we established expression patterns of responses identified in the contents of the interviews transcriptions. These were classified as:

- Positive attitude and without contradiction in the question raised, identified by the symbol "↑";
- Contradiction positioning, with conflicting opinions revealed by the respondent for each question carried, identified by the symbol "⊙";

- Placement of negation and without contradiction in the question raised, identified by the symbol "↓"; and
- Position of neutrality, i.e., no representation or approval or disapproval, identified by the symbol "N".

The second instrument used in the research consisted on closed questions based on Decree No. 25 of 1994, the Ministry of Work and Employment [3]. This questionnaire contained types of possible risks to be found in the surveyed companies, which should be scored as perceived by the respondent as to its relevance, according to a Likert scale. Subsequently, the number of occurrences for each type of response and respondent were placed briefly in Table 2. In this table, the letters E, W and P correspond to the employer, workers and experts. The values 0, 1, 2 and 3 were the weights used in balancing the risks considered most important, according to the perception of respondents. The values obtained for the weighting were arranged as illustrated in Equation 1, which shows the calculation for Risk 2. It can be checked that the product weight by the number of occurrences in the column "No" would imply a zero value at all. In this case the perception of respondents would refer simply the absence of risk.

$$\text{Equation 1} - 0 \times (0+1+0) + 1 \times (0+2+1) + 2 \times (0+0+2) + 3 \times (0+0+0) = 7$$

What is your perception of the risk relevance?													
	Inexistent			Hardly relevant			Relevant			Very relevant			
	0			1			2			3			
Risk type	E	W	P	E	W	P	E	W	P	E	W	P	Total Weighted
Risk 1	2	2	0	1	1	0	0	0	0	0	0	0	2
Risk 2	0	1	0	0	2	1	0	0	2	0	0	0	7
Risk 3	0	0	1	0	0	0	0	1	2	0	2	2	18
Risk N	2	1	0	2	2	0	1	0	0	0	0	0	5

Table 2 – Table used in the application of closed questionnaire

## RESULTS

The results concerning the responses of open questions of the first instrument can be seen in Table 3. This shows the respective responses to each construct and categorized as described in the methodological procedures.

Construct	Employer 1	Employer 2	Worker 1	Worker 2	Expert 1	Expert 2
Risk and safety perception	↑	↑	⊙	⊙	↓	↓
Accidents	↑	⊙	⊙	↑	↓	↓
Environment	↑	↑	↑	↑	N	N
Training	↓	↓	↓	↓	↓	↓
PPE	↑	↑	↑	↑	↑	↑
CPE	⊙	↓	↑	↑	↑	↑
Machinery and Equipment	↑	↓	↑	↑	↓	↓
Disease	↑	↑	↓	↓	↓	↓
Satisfaction	↑	↑	⊙	⊙	N	N

Table 3 – Categorization of responses according to content analysis

Regarding the risk and safety perception, both entrepreneurs and employees consider the work safe, although this view is not shared by the expert. Although workers have shown such an attitude, they acknowledge some risks, especially noise and lack of security of electrical systems, showing a contradiction in their perceptions.

Another similar contradiction was explained by observing the information about accidents at work. An entrepreneur and a worker reported the occurrence of cuts and/or scratches; even so, they do not consider these facts like accidents. In this case, there is a misunderstanding about the concept of workplace accidents. Minor accidents as mentioned are indicative of unsafe conditions containing the probability of major accident generation. On the other hand, the expert reports the occurrence of a fatal accident in the region in a business council, which was not comprised in the sample.

In relation to the environment, both business and workers had been categorical that their activities have no significant impact. The expert, however, takes over a more careful position. He suggests further studies about the subject and the lack of conclusions on the occurrence of significant impacts to the environment. None of the respondents reported complaints from the community related to the activities undertaken by companies.

Concerning the completion of training and skills development related to occupational health, there was a consensus about its inexistence. It was only pointed to a single event, a series of conferences given in a single day, promoted by regional syndicate supported by FUNDACENTRO, performing about 3 hours.

Another point on which all respondents agree refers to the existence of distribution and use of Personal Protective Equipment (PPE). It was also confirmed by employers and workers the understanding about the distribution and use of PPE is the only one sufficient condition to ensure the work safety and health. This view was not shared by the expert. Otherwise, regarding to Collective Protective Equipment (CPE), it was noted the difficulty of understanding what they really consist and their applicability in despite of their usage, which implies as a contradictory situation. This difficulty arises among entrepreneurs and workers. There was also, in the expert point of view that some CPE (Machine protections) could not be used in order to have been developed by the company itself and do not fully respect the requirements established by specific laws and norms.

In the event of machinery and equipment maintenance it is considered by the respondents that companies understanding is simplistic and restricted to occasional stops for lubrication. There is a consensus among them about the lack of maintenance planning, including the expert.

A strong antagonism between the point of view of both employer and employee is identified in relation to mental work. Entrepreneurs do not recognize the activities developed as a source of diseases. Workers, in turn, believe they can get sick, but restrict it to repetitive strain injuries related to work (RSI). While noise is recognized by workers and employers as the most relevant risk present in work activities it was not established a cause effect relation between noise exposure and induced hearing loss. On the other hand, workers seem to admit the possibility of get occupational illness. In this sense, it is a contradiction, since they did not recognize on their ambiance the existence of sources of risk and security issues. Regarding to the expert, he also relates to induced hearing loss, also including RSI and the possibility of respiratory problems arising from exposure to wood dust.

On job satisfaction employers have adopted a positive attitude. However, again, their positions are contradictory, since it was also expressed the desire for a career change. The expert in turn has adopted a neutral position.

The second survey instrument, implying objective questions, presented results summarized in Table 4. According to this table, the sum of perceptions expressed for each risk is always 6, i.e., they are the representations of six responses from two companies and the expert. Based on the analysis of Table 4, evidenced by the values identified in the total weighted column and presented in Figure 1, the noise and shock are the most critical sources according to the survey sample. Then, there is still an important perception among the respondents about the existence of fire risks, lack of machines protection, layout inadequate and intense physical efforts. These data reinforce contradictory positions between employers and workers, pointed that working conditions were safe.

Risk Type	Relevance and N° Response Total												Total Weighted
	Inexistent			Hardly relevant			Relevant			Very relevant			
	E	W	P	E	W	P	E	W	P	E	W	P	
A Noise				1			1	2		2			13
A Vibration	1	1	2	1						1			4
A Non-ionizing radiation (Sun)	2	2	2										0
A Radiation weld	2	2	2										0
A Extreme temperature: external source ( ) environment ( )	2		2	1						1			4
A Humidity	2	1	2							1			3
B Dust (wood)	1		2	1				1		1			6
B Metal fume (weld)	2	2	2										0
B Gases and vapors (e.g., volatile chemicals)	2	2	2										0
B Mists (e.g., painting)	2	2	2										0
B Mineral Oils and greases (contact)	2		2	1				1					3
B Other chemicals (which one?)	2	1	2	1									1
C Biological (microorganisms)	1	2	2							1			3
D Intense exertion (effort)	1			1		2		1			1		8
D Manual handling and weight transportation	1	1		1	1	2							4
D Awkward postures demand	2	2				2							2
D Productivity strict control (time pressure)	2	2				2							2
D Excessive of work pace exigency	2	2				2							2
D Shift work (at night)	2	2	2										0
D Long day's work	2	2	2										0
D Monotony and repetitiveness		2		1		2		1					5
D The relationship with other workers is pleasant?	2	2				2							2
D Other situations related to physical or mental stress	1	2				2				1			5
E Physical arrangement (layout) inadequate	1	1		1				2		1			8
E Poor lighting	2				2	2							4
E Fire or explosion risk	1			1				2	2				9
E Unprotected Machinery and equipment	1	1					1		2		1		9
E Electricity (electric shock risk)	1			1					2		2		11
E Inadequate, defective and lack of maintenance tools	2	2							2				4
E Irregular floors (fall risk)	2	2							2				4
E Waste and dirty accumulation	2	2							2				4
E Inadequate storage	2	2				2							2
E Venomous animals	2	1	2	1									1
E Other situations that can lead to accidents	2	2	2										0
Other risks not mentioned above	2	2	2										0

A: Physics Risk      B: Chemicals Risk      C: Biohazards      D: Ergonomics Risk      E: Accidents Risk

Table 4 – Results of objective questions

Still, at Table 4 most of the replications pointing out the risks as very important were made by workers, which are contrary to the expert considerations. This presented a greater number of perceptions pointing out the risks with hardly relevance (56%) or relevant (44%). Also, in Table 4 and Figure 1 it can be inferred while the risks associated with noise and electricity are critical, neither of them was identified as highly relevant by the employers. In 34.6% of cases all of them understand that there was no presence of suggested risks.

A strong discrepancy between the expert answers compared to employees and workers was observed relating to the risks coming from inadequate, defective and lack of maintenance tools, irregular floors and lack of cleaning and waste and dirty accumulation. These risks were highlighted by the expert as evident,

especially regarding to irregular floors that are compacted and unevenness, as well as cleaning, where the grime accumulation covers up information boards and electric devices.

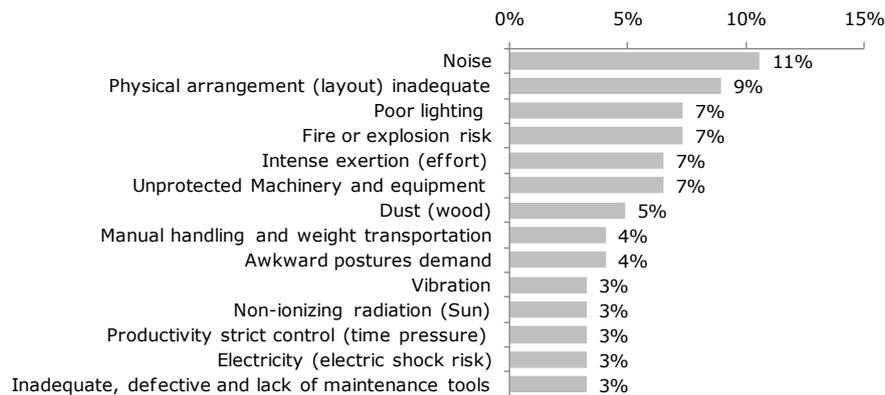


Figure 1 - Relationship of the values obtained in items with greater value-weighted

## DISCUSSION

The analysis of data collected in the field revealed a number of peculiarities related to risk perceptions among the respondents. The answers highlighted the need of greater attention to the booming lumber industry concerning occupational health and safety.

Most of the contradictions appear between the workers, which showed lack of knowledge of its working condition and the perception and identification of risks. A potential cause of this may be just the lack of information and low education level in these enterprises. Lima [9], for example, indicates the existence of significant differences between the risks to which workers are subjected and the level of schooling. This observation was also performed by Santana [16], who also noted the significant influence of educational level in the incidence of accidents.

The unanimity of the responses of entrepreneurs asserting that the activity is safe, according to Dejours [5], this should not be considered as if the workers are completely unaware of risks inherent in that activity. On the contrary, this strategy raises the entire existence of danger, where the employee adds to the inherent risk of working process your own risk, minimizing or simply denying the risk. This strategy the author describes as defensive ideology. The main function of this defensive ideology would provide to the worker survival conditions in a harmful working environment process through the establishment of a symbolic value which the worker dominates the danger and not vice versa.

The lack of risks perception also extends to other concepts such as, for example, the non-recognition of minor accidents or their disregard like working accidents. Beyond this the respondents ignore cause effect relation between excessive noise and the occupational disease. In this context, workers exposed to intense occupational noise present increased risk for injuries as compared to workers not exposed to the same situation [6].

Contrary to the opinion of entrepreneurs about the inexistent occurrence of diseases, the workers are positive pointing out primarily problems like back pain injuries. Also there is the need for adjustments and improvements in the sheds conditions where they are installed sawmills. The sites visited were fully open and are subject to extremes temperatures. This seems to be a critical aspect, since, according to Couto [4], when the weather is unfavorable, there is malaise and fatigue, physical and nervous stress, decreased efficiency and increased risk of errors and accidents as well as exposing the body to several diseases.

We also noticed that in the sawmills visited the conditions of tools and CPE are lagging behind, which was supported by entrepreneurs and workers who reported the absence of an adequate maintenance plan. When looking at Keppe [8] study, for example, these problems are recurrent not only in the studied region, but also elsewhere in the country, allowing an extrapolation degree. So, this is something that really should be addressed in future improvement actions.

Activities aimed at training workers in the region under study proved to be precarious. However, there is a lack of effective programs, well designed, with good management, with a multidisciplinary approach and more than this, sustainable. These are also difficult to apply in this productive sector, mainly due to the low level of education of the population involved. In this regard, an important alternative consists to work hard data, to bring the reality of those involved to discuss with a view to optimizing the educational process. In order to stimulate the collective construction of affordable solutions and applicable short-and medium-enterprises are characterized as micro and small businesses.

## CONCLUSIONS

Seeking to identify the perceptions of professionals working in sawmills in south central of Rio Grande do Sul and experts, in relation to occupational health and safety, as well as to identify erroneous or conflicting positions among the professionals, some points could be noticed.

First it was noted the frequent occurrence of contradictions among the professionals working in this region (employees or entrepreneurs), with regard to their exposed risks understanding and their work health condition. Implications may prove harmful, as the minimization of risks and their consequences can easily contribute to the accidents occurrence of important proportions. As aggravation of this scenario, it was found that, in fact, working conditions in the studied area are poor, with the lack of: attention to dangerous or inadequate buildings, appropriate work, and the inexistence or inefficient equipment to protect collective and individually the workers.

However, it can be suggested an incipient manifestation in enterprises in order to make it worth the working conditions. The findings presented here reveal a hard way to improve the current situation of companies in the region. Given the possible extrapolation of the conditions prevailing in this study, it is still possible to infer that the production chain of forest cutting and processing plantations elsewhere in this state can be also poor, expressing the need of improvements in occupational health and safety. Thus, this leads to suggest in future work to reproduce this one in other regions and with larger samples.

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