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# Development of a multilevel safety climate measure for furniture industries

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## ABSTRACT

Safety climate is a relevant measure for monitoring safety conditions. However, there is still no consensus about safety climate measures. This study aims to develop and to analyse the suitability of an instrument to measure the safety climate in Portuguese furniture industries, using a multilevel structure, through a pilot survey. A questionnaire, called Safety Climate in Wood Industries, was developed. The first part comprised workers' demographic questions. The second part included 39 items for measuring safety climate, analysing three different levels: organizational, group and individual levels. The questionnaire was tested on a sample of 29 workers of a Portuguese furniture industry. The company safety conditions were also analysed. The analysis of the questionnaire results shows significant differences on safety climate among sectors, which may be related to differences in safety conditions among sectors. The study shows that the questionnaire allows identifying different safety climates in the same enterprise.

**KEYWORDS:** Furniture, Multilevel, Safety climate, Safety conditions

## 1. INTRODUCTION

The furniture sector represents a great impact in the Portuguese economy, particularly in the North. The number of occupational accidents in this sector is high. Portugal does not have specific statistics on number of accidents in the furniture industries. According to the Portuguese statistics, in 2007, a total of 77 423 accidents occurred in the manufacturing industries, where 6 128 refers to the wood, corks and related products sector (6 fatal and 6 122 non-fatal accidents) (GEP, 2010). Contradicting this scenario, this is a sector that has attempted to increase its competitiveness. Concurrently, it is expected its modernization, together with an increase of the safety concerns.

This actual scenario, on the Portuguese furniture industries, shows the need that enterprises have to analyse their state of safety, as well as, the safety progress. With this purpose, quantitative measures can be used, as the accident rates (Cameron & Raman, 2005). However, in some cases, in particular for small and medium size enterprises (SMES), the data needed are not available or, in other cases, the number of accidents is under-reported and do not reflect the actual safety condition. Therefore, the use of other measures is important. In this context, safety climate have been referred as a relevant measure to monitor safety conditions (Flin *et al.*, 2000), overcoming some of the limitations of traditional safety measures.

Previous research has been developed a considerable effort for the construction of a valid and reliable safety climate instrument (Guldenmund, 2007). However, there is still no consensus about safety climate measures, i.e., how many and what factors must be considered, and the number and which items need to be included (Lu & Yang, 2011). In this context, many researches have given rise to different instruments to measure safety climate (see e.g. Zohar & Luria, 2005; Tharaldsen *et al.*, 2008; Håvold, 2010; Lu & Yang, 2011).

The most of previous studies about safety climate only considered a single level of analysis. Recently, this practice has been contested. Different authors claim that, as the scores of the safety climate are aggregated in a single level, ignoring the hierarchical structure of the data, climate relationships in an organization remain unwell specified (Zohar & Luria, 2005; Guldenmund, 2007). These criticisms are related with the companies' multilevel structure. This hierarchical structure has induced researchers recently to consider a multilevel analysis of the safety climate. In this structure, and in accordance to Guldenmund (2007), it is possible to distinguish three key impact levels: organizational level, group level and individual level. Therefore, multi sub-climates can be founded in a specific organization (Clarke, 2006; Guldenmund, 2007; Zohar, 2008).

In this context, this study aims to develop and to analyse the suitability of an instrument to measure the safety climate in Portuguese furniture industries, using a multilevel structure, through a pilot survey. This survey attempts not only to get the feedback about the clarity of items, but also to analyse if the questionnaire identifies sub-climates, as expected.

## 2. MATERIALS AND METHOD

### 2.1. Sample

The results of the study were based on data collected from one furniture enterprise with 69 workers. The participants who accepted to take part in this study were 29 effective workers from different sectors of the enterprise.

### 2.2. Instrument

An instrument for measuring the safety climate considering a multilevel structure, called Safety Climate in Wood Industries (SCWI), was developed and applied. The SCWI included two main parts. The first part included demographic questions about age, gender, department/sector, professional activity, number of years that works in the company, number of years that develop the referred professional activity, and involvement in past accidents. The

second part included 39 items for measuring safety climate, analysing three different levels: organizational level, group level and individual level.

The items and scales of both organizational level and group level were adapted from Zohar & Luria (2005). The items were reworded and rephrased to suit local working practices and culture. Seven items were eliminated because were double-barrelled. Six new industry-specific items were included, assuming that this allowed the instrument to reflect the most important organizational features in these companies and a better within-enterprises comparison (Zohar, 2008). The organizational level included 16 items and the group level 13 items. The individual level, not considered by Zohar & Luria (2005) work, is considered an important one. The items included in group level are only related with supervisors' discretion, however, other factors related with workplace or co-workers may also have influence on individuals' safety climate perceptions/attitudes. It supposed that these items allow a better distinction among sub-climates in this sector of activity, identifying perceptions/attitudes related with co-workers and activity specificities influences. In this context, 10 items to measure individual level were included, based on literature review, in particularly Tharaldsen *et al.* (2008) work. 26 items were phrased positively and 13 items negatively, in order to prevent any tendency on responses. The level of agreement with each item was assessed by means of a five-point Likert scale ranging from "1=Strongly disagree" to "5=Strongly agree". A "not applicable" option was also contemplated to be used where appropriate. The SCWI questionnaire was delivered to five Occupational Safety & Health (OSH) experts in order to review, examine and test the questionnaire. Some improvements were suggested and taking into account.

### 3. RESULTS AND DISCUSSION

The workers age vary from 19 to a maximum of 59 years old, with a mean around 35 years. Workers collaborate with the company in average for 7 years and exert such activity on average for 11, being considered experienced workers.

All inquired workers understood the questions. Only three workers left one question in blank, not having used the option "not apply". Four workers suggested the restructuring of the questionnaire format, including the concordance scale on the second page, facilitating the questionnaire fill.

An analysis of the safety climate total scores was performed by sector of activity, being the results presented on Table I. It was performed the average of the obtained answers for each item by sector, and then, the obtained averages were added up by level in analysis, in order to achieve the score for each level and sector. The average and sum for all levels was also performed and define the total score presented. As expected, the analysis of the questionnaire results shows differences on safety climate among sectors (based on a non parametric test, Friedman,  $p < 0.05$ ), indicating the presence of multi-subclimates. This is in accordance with that the previous studies suggest (Clarke, 2006; Guldenmund, 2007; Zohar, 2008). Results show that the differences were significant among the levels by sector in analysis. Polish sector presents higher safety climate as opposed to the Cut sector with the lower score. These differences can be related with the differences in the risk levels among the sectors. The results also show that these differences remain, making it more visible in the group and individual levels. In this context, results show the importance of the inclusion of the individual level in the safety climate work questionnaire, increment the work developed by Zohar & Luria (2005).

Table I: Safety climate scores by sector and level of analysis.

Sector	Organizational level	Group level	Individual level	Total score
Production	65	49	37	150
Cut	57	39	29	125
Storage	60	52	38	150
Montage	62	45	34	141
Polish	64	52	41	156

### 4. CONCLUSIONS

This work describes the endeavour to develop and to analyse the suitability of an instrument to perform a multilevel analysis of the safety climate for furniture industries. The results show that the questionnaire allows identifying different safety climates in the same enterprise. Furthermore, this work emphasized the use three levels to perform a multilevel safety climate analysis: organizational level, group level and individual level.

This is only a first attempt to analyse the suitability of the instrument. This study was developed in a company with a good safety and health performance. The results cannot be generalized to the whole sub-sector. In the future, the questionnaire will be applied to more furniture industries, with different characteristics, in order not only to analyse its reliability, but also to find the main safety climate structure. An analysis of the relation between safety climate and safety performance will be performed.

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