Assessment and Improvement
Opportunities for Occupational Health
and Safety in the Portuguese Food
Processing Industry

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and Fernando Charrua Santos

Abstract The Agrifood Industry is the largest Portuguese Industry, constituted
mainly by micro, small and medium-sized enterprises (SMEs). It is noted that more
than any other type of organization SMEs have their own specificities that make it
particularly appropriate to develop tools to facilitate communication and knowledge
sharing for employers and workers. To this extent, identifying critical success
factors is the key to increase SMEs productivity. Likewise, Occupational Safety and
Health (OSH) in SMEs have their own characteristics, which difficult the prevention
strategies implementation and aggravate the problematic of work accidents.
This study analyzes a fieldwork in 60 food processing companies in Portugal,
related to the dairy, meat processing, bakery and horticultural subsectors, collected
in the report “Characterization and Analysis of the Conditions of Safety and Health
at Work in Agrifood Enterprises”. The analysis of the results allowed to identify
that, at the national and regional level, the main failures are concerned with (1) lack
of risk assessments regarding occupational noise, lighting, thermal environment and
vibrations; (2) safety signaling, the circulation ways are not identified with
appropriate safety colors; (3) general lighting, with too many shade areas and finally
(4) complementary presence of associated risks to falls at the same level, falling of
objects, thermal burns, the use of machines and equipment, fire, mechanical,
ergonomic hazards and incorrect body postures. The present study aims to interpret
the requirements that are in the ideal pattern of work through literature review

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regarding reality in the fields of OSH, in the Agrifood Industry, with the aim of contributing to the improvement of OSH management and accident prevention of work accidents.

**Keywords** Agrifood industry · Occupational safety and health · Small and medium-sized enterprises · Dairy · Meat processing · Bakery · Horticultural

1 Introduction

By 2016, micro, small and medium-sized enterprises (SMEs) accounted for 98.8% of all non-financial enterprises in the European Union (EU), equivalent to 22.7 million enterprises [11], employing around half of EU workers, which justifies the need for effective management of Occupational Safety and Health (OSH) in these enterprises, in order to provide the well-being of workers as well as a work environment with harmonized rules, which will enable high-quality products to be obtained, benefiting consumers and businesses, and ensuring their long-term survival [12]. However, statistics show that most of the workers do not have adequate safety and health protection in their workplace, and the percentage of work-related injuries is higher within SME workers [15]. The resources available to SMEs have multiple limitations, which leads companies to opt for cost reduction strategies in order to ensure their economic viability [7]. It is apparent that many workers in these enterprises are more likely to have worse working conditions, less job quality and proportionately greater risks to health, safety and well-being. Taking into account the numbers, the size of the company becomes an organizational risk factor, and the importance of effective means to prevent damage to the health and safety of its workers is evident [3].

Thus, the reasons that identify the poor adherence to OSH management measures in these companies include [16]:

- The weak economic situation of many SMEs and the poor investment they can make in OSH infrastructures;
- The limited level of knowledge, awareness and competence of their owners/managers in relation to OSH, as well as their regulatory requirements;
- Limited ability to manage the business systematically;
- Their attitudes and priorities, given their limited resources and concern for the economic survival of their company, which make SST unimportant.

According to the National Authority for Working Conditions (ACT), the Portuguese Manufacturing Industry corresponds to the sector of activity that presented in the year 2014 the largest number of accidents at work, about 54,000 accidents. With regard to fatal accidents, this sector occupied the second economic activity with more accidents, with a total of 25.
In addition to work-related accidents, several occupational diseases have been linked to work. According to ACT, in 2016, it is also the Manufacturing Industry, which presents the largest number of occupational diseases, about 2,150 records. The most frequent work-related diseases, depending on the risk factor, are the ones caused by physical agents that register the highest number of certified occupational diseases, followed by respiratory system and skin diseases [1].

Faced with these high accident rates, the safety and health issue in the Manufacturing Industry is of particular relevance. Despite all the existing prevention techniques and standards, it is essential that companies have OSH management systems that help to anticipate, assess and control risks by preventing occupational accidents and occupational diseases associated with them [13].

Increasingly, issues related to the health and safety of workers are valued, as the inclusion of OSH preventive measures in companies, can prevent occupational diseases and occupational accidents, considering all productive activities and technological processes involved [10]. It will contribute not only to the reduction of the number of fatalities, but also to the reduction of the number of deaths, incapacities, lost workdays, also for the resulting economic and social costs.

As well as equipment and a working environment appropriately adapted to the needs of the work process, whose maintenance is ensured, improve quality and reduce health and safety risks by increasing productivity [2].

In addition, good practices in the field of health and safety at work are powerful tools to stimulate productivity [8, 14]. Healthy workers can influence company performance: fewer absences from work due to illness, minimizing downtime in the production cycle, higher productivity and quality of work. As well as equipment and a working environment appropriately adapted to the needs of the work process, whose maintenance is ensured, improve quality and reduce health and safety risks by increasing productivity [2]. Therefore, more efficient production processes become more value-added products/services, competitiveness and, consequently, the conquest of markets. Despite the huge global economic recession, many employers are committed to OSH standards [13].

The Agrifood Industry is one of the strategic poles of the Portuguese economy, for the essentiality of the goods it produces and for the value and employment, it generates, and it is in the EU, the largest Industry with a turnover of 1,048 billion euros, of which 51.6% of this figure comes from SMEs [5].

In 2017, SMEs represented 99.9% of the Portuguese business sector and according to statistics, the Agrifood Industry in Portugal represents 20% of the Manufacturing Industry and consists of about 12,000 companies, mostly SMEs, employing around 112,000 workers and representing a turnover of approximately 16,000 million euros [4].

Therefore, since the Agrifood Industry is one of the strategic poles of the Portuguese economy and plays an increasingly important role [9], this study aims to address the essential elements in a perspective of occupational risk prevention in Portuguese SMEs.
2 Materials and Methods

The study analyzes the data collected under the +AGRO project—Organizational Management, Energy Efficiency and Occupational Health and Safety in Agrifood Industry, in particular those contained in the report “Characterization and Analysis of the Conditions of Safety and Health at Work in Agrifood Enterprises” [6], available at: https://maisagro.pt/sst/caracterizacao/.

In the scope of the study, the sample analyzed shows a distribution of 60 companies distributed among the following subsectors (Fig. 1): 15 companies belong to the subsector of meat processing, 12 to the subsector of horticultural products, 16 to the subsector of dairy products and 17 to the subsector of bakery products.

The interpretation of the results was based on direct analysis of the data contained in the report. The data collected have been compiled into tables that showed the values by subsector and region.

In order to systematize the data analysis, it was defined an hierarchy of occupational safety and health conditions, to identify the main risks present in the subsectors, the tables presented a caption with a color code that explains the levels of greater or lesser percentage of companies has the parameters of health and safety at work regulated (Table 1). The percentage refers to the amount of companies analyzed.

Where 0% means the absence of non-conformity in the parameters of occupational safety and health conditions. In other words, all companies find themselves with the regularized parameters, for this motive was assigned the gray color.

![Fig. 1 Distribution of companies by subsector. Source Gaspar et al. [6]](image)

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<td>0%</td>
<td>Regularized</td>
<td>Gray</td>
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<tr>
<td>1% ≥ 49%</td>
<td>Acceptable level</td>
<td>Medium</td>
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<tr>
<td>50% ≤ 100%</td>
<td>Not acceptable</td>
<td>Dark</td>
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*Source Own elaboration*
Darker gray means between 1 and 49% of the companies are not within the parameters of occupational safety and health conditions met, is considered an acceptable level because more than half of the enterprises are smoothed.

The black color indicates that between 50 and 100% of the companies are not within the parameters of occupational safety and health conditions, so it is considered as a level not acceptable, as it indicates that more than half of the total companies analyzed are not smoothed.

### 3 Results and Discussion

In this article, the interpretation of the results was only by subsector were comparatively analyzed, identifying the most eminent risks.

Overall, most of the companies (87%) of the four subsectors have organized occupational health and safety services, although 5% of these companies do not have the services according to the legal requirements. Although most of the companies in these subsectors have OSH services organized, only 60% of the companies carried out risk assessments. As far as occupational noise risk assessment is concerned, only 37% of the companies in the 4 subsectors carried out this type of studies, and according to the project measurements, it was found that in all subsectors there are jobs with noise levels which exceed 87 dB (A), which corresponds to the daily personal exposure limit value. In the case of the thermal environment, only 5% of the companies analyzed in the totality evaluated this parameter. The vibrations assessment is also very neglected by the companies, since only 3% of the companies carried out assessments.

The signalling of circulation routes, which is an important factor to prevent accidents, is not considered an important factor by companies either, since only in 13% of companies in all subsectors there are circulation routes signalled, emphasizing that only 2% of these companies painted the circulation routes of the appropriate colour, that is, yellow or white.

Regarding lighting, in 62% of companies there are shadow areas in the workplace and should be considered one of the main risks by the companies. Low lighting levels can lead to work accidents, increases workers visual fatigue and manufacturing defects, which in this case may give rise to non-compliant food products or with labelling mistakes.

Regarding the complementary risks, the possibility of falls at the same level occurrence, due to the existence of slippery or inadequate floor, was detected in 82% of the companies under study. Another risk that occurs in most companies of the various subsectors analyzed is of the occurrence of thermal burns (77%). With regard to the risks associated with machinery and equipment, 88% of the companies in all subsectors presented this risk, which may entail risks to the physical integrity of workers. The risk of entrapment, shocks with objects, cuts or perforations was observed in 92% of companies. The risk of fall of objects that can hit and injure workers was identified in 79% of companies. Last but not least, another risk found
in most of the companies studied is due to inadequate and poorly ergonomic postures. These situations were observed in 93% of companies. Focusing on the four subsectors studied, it is concluded that the subsector of horticultural products is the most problematic subsector with high percentages in most of the analyzed parameters. Besides the risks common to all other subsectors of activities, it presents some others that require special attention, for example, in only 58% of companies there are OSH services organized. In relation to the regions covered by the project, it is complex and difficult to identify the most affected region of intervention, even in each subsector.

Carrying out risk assessments, tests and measurements procedures during the activities to characterize and analyze the OSH conditions it is still possible through a great progression margin to guarantee the workers’ safety and health. The most eminent risks in the four subsectors (Fig. 2) analyzed were firstly the lack of risk assessments per workstation, specifically, noise level, thermal environment and vibrations. Secondly, the security signalling, since most of the circulation routes were not signalized and in the cases that they were in majority of them the colour was not appropriate. Thirdly the illumination with the existence of areas with shadows. Finally, in relation to the existence of complementary risks, such as the ones associated with falls, thermal burns, machinery and equipment, mechanical hazards, falling objects and ergonomic risks and incorrect body postures. It is also concluded that, among the four subsectors studied, the subsector of horticultural products is the most problematic subsector, since it has presented high percentages in most of the parameters analyzed, and besides the risks common to all other subsectors of activities, have presented some other ones that require their due attention.

4 Conclusion

The conclusions of this study indicate that risks may be better managed in this group of companies, where good OSH conditions are associated with business success. The size of an enterprise limits its resources, its financial capacity and its technical means to analyze risks and to adopt preventive practices, however, prevention is essential for a healthy workplace in every company, regardless its category or size. Then, it is a priority to carry out periodic risks assessments either to identify hazards, to implement measures to eliminate or reduce them, in order to protect the workers properly.
A well-implemented OSH service guarantees the reduction of accidents, occupational diseases, absenteeism and consequently improves the quality of work, resulting in an increase in productivity and greater competitiveness of the company. But however important an OSH program may be, and the better the tools it provides for the diagnosis and resolution of work risks, if there is no willingness, participation and commitment of all involved in these actions, especially employers and workers, the results will be limited, both qualitatively and quantitatively. Work in Industry requires concentration and a sense of responsibility. The worker must possess the technical, physical and psychological skills necessary to comply with safety standards and adopt a preventive approach in order to avoid work-related accidents and future work-related illnesses. These capabilities should be part of the measures proposed in the information and training programs for OSH promotion, sensitizing workers to the risks they are exposed in order to increase their awareness of them.

One of the key elements of success is how stakeholders, from employers and workers to government agencies, approach this thematic. Creating a new policy framework will help SMEs to grow, reducing the bureaucratic process to avoid the discouragement associated with the predictability of rising costs; facilitating access to finance; improving access to third country markets; supporting the acquisition of skills and encouraging investment in innovation. In order to protect workers, where health and safety interventions can affect productivity and profits, these can be some of the ways to level the field of professional action to ensure that all businesses operate in a similar and safe way for workers and consumers.

It is also concluded that the report analyzed presents results whose domain can lead to some misunderstandings due to some lack of clarity in the criteria used in the evaluation. The opportunity for a more detailed investigation, provided by greater and equal sample of companies in each subsector, as well as the measurements in all workstations, reflect a deeper comparative analysis, with stricter quantitative data on the national reality. Nevertheless, go beyond limited perspectives by the authors of the report, would be advantageous for instance to include psychosocial risks evaluation.

Finally, given the importance of this thematic, there is still a long way to go in the field of research, not only in health and safety at work in Agrifood companies, but also in the SMEs.

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References


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