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# Occupational Risk Prevention in the Management of Companies in the Electricity Sector. The case of Galicia (Spain)

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The present work aims at analysing the awareness and prevention in the management system of companies in the electricity sector, in order to detect the main shortcomings, seeking to improve in terms of occupational risk prevention. After collecting and analyzing a sample of 180 surveys, numerous shortcomings have been detected in the sector of electrical and telecommunications installations in Galicia (Spain), including the lack of established goals and objectives in preventive matters or the absence of the use of preventive modalities.

**Keywords:** Occupational risk prevention, Accident at work, Electrical installers, Electricity

## Introduction

At present, it is essential that companies in any sector are aware of the importance of Occupational Risk Prevention (ORP) and strive to improve working conditions and ensure the safety and health of their workers[1]. The employer and/or director must see the occupational risk protection as a benefit for the company and not just an expense, and be sufficiently involved with the occupational risk prevention and its integration into the organization. Therefore, it is essential to think beyond the scope of work and consider the behaviors of those who will execute it[2].Prevention guarantees the safety and health of company workers[2], it is not an additional activity, but a set of activities or measures that must be adopted in all phases of the activity of the company to avoid or reduce occupational hazards. Although this is a necessary aspect in every sector, there are industries where occupational hazards are higher due to associated physical work or environmental conditions. Hence, sectors such as construction are those with the highest work accidents[3]. This paper focuses on a high-risk branch linked to the construction sector, that of electrical and telecommunications installations, for which a collection of primary data is performed. Therefore, owning occupational risk protection plans and complying with all the measures contemplated in the occupational risk protection regulations is essential[1,4]. The objective of this research is to analyze the degree of integration of prevention in the management system of companies in the electricity sector, as well as their preventive management, in the case of the autonomous community of Galicia (Spain). In Galicia, where a total of 981 companies are registered in this sector, a survey to a sample of 180 companies has been carried out. A series of questions have been asked to know the situation of the companies and more than 30 items have been valued through Likert scales of 4 and 5 points. After presenting the results obtained, the main weaknesses of the sector regarding occupational risk protection will be discussed.

## Conceptual Framework

Occupational diseases, as well as occupational accidents, have declined as a result of technological advances, protective equipment, safer machinery and awareness in compliance with occupational risk protection regulations[5,6]. This is stated by the International Labor Organization (ILO), being a key element for the management of occupational safety and health, promoting a culture of prevention within the company[2,4,6,7]. In turn, security organizations have been created and specific regulations have been established for many activities[4,7,8]. In the last decade the number of work-related deaths has decreased in many European countries, but there are still many serious accidents at

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work. According to Eurostat data, in 2017, the European Union suffered 3,182 fatal accidents in the workplace. This represents a fatality rate of 2.21 per 100,000 workers[9]. When talking about an accident at work, there are several definitions found, but all of them have three elements in common: the description of the causes, the events that lead to them and the consequences. The causes are multiple or sequential; sudden, unexpected and unplanned events; and the consequences are damage to people, property, and/or production[10,11,12]. An analysis at European level of the most current situation regarding occupational accidents shows that there are still high figures, with more than 3 million occupational accidents in the EU in 2015. Countries such as Germany, France and Spain are located on top of the ranking, with more than 400,000 cases[9]. Partiendo de la introducción planteada y el marco conceptual, se plantean las siguientes hipótesis en este trabajo, derivadas de los objetivos propuestas en el siguiente epígrafe:

H1. The level of integration of prevention in the management of companies in the Galician electricity sector is low.

H2. The level of prevention depends on the type of company.

H3 Workers are only asked questions about prevention of their work teams.

## Materials and methods

In order to analyze the degree of integration of prevention in the management system of companies in the electricity sector, as well as its preventive management, this work has opted for the collection of primary data through the quantitative technique of the questionnaire. This questionnaire has been designed and structured in two parts: i) general data of the company; ii) integration of the ORP in the management and organizational culture of the company. For the first block, multi-response questions have been used. For the second block, multi-response questions have been combined with variable valuation through 4 and 5-point Likert scales. The specific objectives of the study are: 1. Verify if the level of integration of prevention in the management system of companies in the electricity sector in Galicia is low; 2. Check if there is a dependency between the level of prevention and the type of company; 3. Verify if the main queries made to workers in relation to the ORP are mainly focused on the selection of work teams. For this, a descriptive analysis of the questions and scales used is performed, as well as the Pearson chi-square test to each of the items of the prevention construct and the variables of the company profile, in order to verify the existence of possible links (objective two).The reliability of the analyzed construct and a factor analysis are also verified in order to better understand the underlying dimensions of this construct. The population under study were the 981 companies in the electricity sector of Galicia (Spain), (Ministry of Economy and Business, 2016) of which, through random sampling, 180 were surveyed. Since this is a finite population, the sampling error is ± 6.6% (for a confidence level of 95%).

## Results

The electricity sector in the Galician autonomous community of Spain is a sector mainly made up of small companies oriented to the provision of services in the field of installation and repair of electrical and telecommunications equipment and/or systems. Some of the companies are implementing an occupational health and safety management system as part of their risk management strategy, responding to legislative changes and protecting their workers. Only 4.7% of the companies in the sample affirm that they have implemented an occupational health and safety management system based on the OHSAS 18001 specification and another 4.2% that have not implemented it but are beginning the implementation process. 8.49% say they have implemented some type of occupational health and safety management system (Corporate Social Responsibility - CSR). The rest of the companies (82.61%) have not implemented a health and safety management system.

### i) Level of integration of prevention in the management system of companies in the electricity sector

It is measured through 9 items. First, the reliability of this construct is analyzed, obtaining a Crombach Alpha of 0.79, acceptable level, so that none of the items are eliminated.As shown in Table 1, the level of integration of prevention is very low, with an average of 1.27 on a scale of 1 to 5. In the 9 items analyzed the maximum value obtained is 2, and the average obtained is practically 1, that is, nonexistent, in items 2 (the occupational risk prevention plan is disclosed), 3 (the management participates in the design of the plan), 4 (The management leads to the implementation of the plan) and 5 (the prevention policy is integrated into other company policies).

In addition, since the Barlettspherity test has a p-value of less than 0.05 (0.000) and the KMO index is between 0.7 and 1, a factor analysis will be chosen in order to better understand the underlying dimensions of this construct. The 9 items can be grouped into two factors: one more linked to the organization, objectives and role of the worker (1, 6, 7 and 8) and another to the plan and its integration into the company (items 2, 3, 4, 5 and 9). The first factor shows an average value of 1.11 while the second one shows a higher value, 1.48, so the valuations of the second are more positive.

**ii) Check if there is a correlation between the level of prevention and the type of company**

As advanced in the methodology, the non-parametric statistic Pearson chi-square test is used. The variables of the company profile that have been considered are the legal form (company, self-employed with employees and self-employed without employees), number of work centres, number of workers and seniority of the company. To analyze the level of prevention, a total of 9 questions have been asked (Table 3).

Table 2 — Exploratory factor analysis of the level of integration of prevention in the management system

Matrix of rotated components

| | | Component | |
|---|---|---|---|
| | | 1 | 2 |
| IT1 | Occupational safety and health management system implemented | | .453 |
| IT2 | The occupational risk prevention plan is disclosed | .914 | |
| IT3 | The management participates in the design of the plan | .624 | |
| IT4 | The management leads the implementation of the plan | .875 | |
| IT5 | The prevention policy is integrated into other company policies | .587 | |
| IT6 | The company has objectives in preventive matters | | .416 |
| IT7 | The organization chart contemplates the functions in preventive matter | | .800 |
| IT8 | The employer promotes asking for advice on preventive matters | | .783 |
| IT9 | There is advice on preventive matters | .601 | |

Extraction method: Analysis of main components
Rotation method: Varimax normalization with Kaiser

Table 1 — Items that measure the level of integration of prevention in the management system

| | | N | Minimum | Maximum | Average | Typ. Desv. |
|---|---|---|---|---|---|---|
| IT1 | Occupational safety and health management system implemented | 180 | 1 | 2 | 1.97 | .180 |
| IT2 | The occupational risk prevention plan is disclosed | 180 | 1 | 2 | 1.06 | .230 |
| IT3 | The management participates in the design of the plan | 180 | 1 | 2 | 1.08 | .277 |
| IT4 | The management leads the implementation of the plan | 180 | 1 | 2 | 1.07 | .260 |
| IT5 | The prevention policy is integrated into other company policies | 180 | 1 | 2 | 1.09 | .293 |
| IT6 | The company has objectives in preventive matters | 180 | 1 | 2 | 1.38 | .488 |
| IT7 | The organization chart contemplates the functions in preventive matter | 180 | 1 | 2 | 1.34 | .477 |
| IT8 | The employer promotes asking for advice on preventive matters | 180 | 1 | 2 | 1.23 | .421 |
| IT9 | There is advice on preventive matters | 180 | 1 | 2 | 1.24 | .428 |
| | Average | 180 | 1 | 2 | 1.27 | .339 |

Table 3 — Pearson chi-square test. Company profile and variables of the level of integration of prevention

| Prevention | Bilateral asymptotic significance | | | |
|---|---|---|---|---|
| | Legal form | No. work centres | No. of workers | Antiquity |
| IT1. Occupational safety and health management system implemented | 0.783 | 0.019 | 0.000 | 0.000 |
| IT2. The occupational risk prevention plan is disclosed | 0.231 | 0.057 | 0.000 | 0.000 |
| IT3. The management participates in the design of the plan | 0.104 | 0.018 | 0.000 | 0.000 |
| IT4. The management leads the implementation of the plan | 0.419 | 0.028 | 0.000 | 0.000 |
| IT5. The prevention policy is integrated into other company policies | 0.075 | 0.051 | 0.000 | 0.000 |
| IT6. The company has objectives in preventive matters | 0.049 | 0.202 | 0.002 | 0.000 |
| IT7. The organization chart contemplates the functions in preventive matter | 0.018 | 0.507 | 0.000 | 0.000 |
| IT8. The employer promotes asking for advice on preventive matters | 0.693 | 0.026 | 0.000 | 0.000 |
| IT9. There is advice on preventive matters | 0.180 | 0.231 | 0.000 | 0.000 |

The null hypothesis with a p-value higher than 0.05 is fully accepted in the case of the number of workers and seniority of the company, with p-values equal to 0.000 in all the analyzed items. In the case of seniority, the higher it is, the higher the level of prevention of the company and in terms of the number of workers the same relationship is established, the more workers, the higher the level of prevention of the company. In the case of the number of centre's and the legal form, specific relationships are established. Thus, in the case of the number of work centre's, there is dependence on items 1, 3 and 4; and in the legal form, the dependency is established with items 6 and 7 (p-values less than 0.05).Specifically, in the case of the number of centre's, although the tendency is that occupational safety and health management system is not implemented, the companies that do have it are more common to be in those with 2-3 work centre's than in those that only have one. Regarding the participation of the management in the design of the plan, the trend is positive, and in the case of companies in which the management does not participate, these are those that have only one work centre. Similarly, the situation where the management leads the implementation of the plan is the majority trend, and the companies that do not do so are those that have only one work centre. Finally, as regards the legal form of companies that do not have preventive objectives, they are mostly companies. And the companies whose organization chart does not contemplate the functions in preventive matter are mostly also societies.

#### iii) Main inquiries made to workers regarding the ORP

Another important aspect of the correct management of occupational risk prevention in companies in the sector is, as established in art. 18 of the Law of ORP, that the employer must consult the workers and allow their participation in all those questions that affect their safety and health, and these entitled to make proposals to the person in charge of the company. The aspects that should be consulted by the workers focus on knowing the occupational hazards, the personal protection equipment to be used, the work team to be used, the satisfaction with the training in ORP received, suggestions or complaints, etc. Concerning health surveillance, it is an obligation of the company to guarantee its workers regular monitoring of their health status based on the risks inherent in their work. In this sense, almost 90% of companies indicate that they always guarantee the surveillance of the health of their employees. It should be remembered that in this sector there are also self-employed without any hired worker. The majority of companies register occupational accidents or any damage to the health of their workers (62.32%), and those that do not indicate it in a high percentage is because they do not apply any registration of occupational accidents (27.56%). Their registration of accidents has not been reported because so far, no accidents have occurred. The rest of the companies either do not register them or do it sometimes. Regarding the documentation in ORP legally required by the Labor Authority, only a small percentage of the companies surveyed do not keep this documentation or only sometimes (4.08%).85.70% of companies indicate that there have been no accidents or work-related illnesses in the workplace in the last 12 months.

## Discussion and Conclusion

After analyzing the data compiled in the surveys carried out by companies in the sector of electrical and telecommunications installers in Galicia, a series of deficiencies or needs were detected in the management of occupational risk prevention. Almost 15% of companies do not adopt any preventive modality. This may answer that there are companies in the sector under the legal form of independent workers without employees. It is necessary to remember that the self-employed with employees have legal obligations concerning ORP in their consideration as entrepreneurs.48.89% of companies do not have established goals and preventive objectives. The ORP plan must include the policy, objectives and goals that the company intends to achieve in preventive matters. In addition, 10% of companies do not consult staff. The employer must consult his/her workers and allow their participation in all those issues that affect their safety and health, having the right to make proposals to the person in charge of the company. The aspects that should be consulted by the workers are focused on knowing the occupational risks in their position, the personal protection equipment to be used, the work team to be used,

the satisfaction with the training in ORP received, obtaining suggestions or complaints, etc. There are even cases in which companies declare that they do not comply with certain aspects of compliance with the legislation, on minimum provisions of ORP against electrical risk. In short, numerous shortcomings are detected in the sector of electrical and telecommunications installations in Galicia. It is essential that the company takes the necessary measures so that the use or presence of electrical energy in the workplace does not generate risks to the health and safety of workers or, if this has not been possible, to minimize such risks.

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