



## Public health risk management in international companies



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### ABSTRACT

The positive impact of the introduction of labor protection standards (OH&S) in the organization is recognized by governments, employers, and workers. However, knowledge of its effective use in small and medium-sized enterprises is still limited. This case study aims to provide a better understanding of how the implementation of integrated management systems (IMS) affects the improvement of the risk management process in the field of occupational safety in medium-sized businesses. Particular attention was paid to employee awareness of the effectiveness of risk management. The study was conducted in companies working in the field of solid waste management, certified in 2009 with IMS for quality–environment, health, and safety. The development of accidents before and after the introduction of IMS was analyzed, and Internet resources were used to describe the perception. Finally, it has been demonstrated that there has been an improvement in the accounting for accidents at work and that IMS has brought more involvement to risk management activities, but their participation has not yet been reached the desired level.

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### 1. Introduction

The implementation of integrated management systems (IMS) is a strategic and operational solution for the organization that promotes effective performance in terms of quality, occupational health, and safety (OH&S). In fact, there is such a tendency to introduce IMS, covering ISO 45001 (or OSHAS, 18001), ISO 14001, and ISO 9001, where such integration can result in a process that is more effective and efficient, reducing bureaucracy and saving money. However, the occupational health and safety management system can be implemented independently, but without the benefits associated with IMS. Its fundamental purpose is to contribute to the constant improvement of occupational health and safety (ISO, 2018b; 2008; 2004). In addition, the strategy promotes competitiveness by helping organizations to demonstrate to both the public and

consumers that they are complying with relevant legislative requirements and other guidelines, that they have appropriate working environment conditions, as well as mechanisms to improve the efficiency and practice of occupational safety and health, protection and enhancement of brand image, sales, profits, profitability, and brand value.

The management system requires employee safety policies, participation in health activities, training and development of the employee's competence, mechanisms for communication and information about possible risks at the workplace, and appropriate control, measures, procedures for planning safety activities (including hazard identification, risk assessment, and risk control), and finally, monitoring and review of activities carried out in the organization. In this context, the success of the occupational health management system depends on the commitment and participation of all levels of the organization, that is, both managers and employees. These aspects are also noted in ISO 45001, which adds, that enterprises can improve their work in the field of occupational health and safety through a systematic process, which should begin with the support of senior management mainly with regard to their management and commitment to occupational health and safety management,

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culture in an organization that supports this system and allocates the necessary resources for its persistence (Aluko et al., 2016). It is also important to integrate the management system with occupational health and safety into the business process management system. The positive impact is introduced by the implementation of health standards at the organization level by governments, employers, and employees. It has an impact on reducing occupational hazards and accidents, not only on risk management and compliance but also on productivity, leading to more efficient use of resources and improved capacity to deliver consistent services while improving financial performance. When the occupational safety management system is mature and adaptive in practice, not only efficiency improvements are expected, but also the overall efficiency of companies (Shevchenko et al., 2020).

It is known that best practices in the field of occupational health and safety contribute to reducing the level of accidents of companies and, at the same time, improving working conditions. OH&S certification also helps improve management commitment, employee participation, and helps improve communication channels. Despite the benefits of IMS when there are different standards given, in particular, ISO 45001 (ISO, 2018b), knowledge of how this contributes to improved health risk management in a small and medium-sized enterprise. Previous studies have noted that SMEs are characterized by less efficient occupational health and safety management systems and performing quality risk assessments than large enterprises. Limited human, economic, and technological resources, low owner knowledge of enterprise risks (manager), and deficiencies in organizational processes are often highlighted as obstacles to the health and safety activities of enterprises, which can also create restrictions to IMS (or OH&S system management when applied independently).

The purpose of the article is to provide a better understanding of how the implementation of integrated management systems (IMS) affects the improvement of health risk management in medium-sized enterprises. Objectives:

- To review existing management systems and identify deficiencies in these methods.
- To show how the implementation of integrated management systems (IMS) affects the improvement of the management process.

## 2. Materials and methods

To study a set and sample of a study conducted in companies that are intended for the disposal of solid household waste for six municipalities in Spain. Activities that are being developed include waste collection, selective waste collection (waste sorting points), and specific collection in restaurants for institutions, including the collection of waste oils for

the production of bio-diesel. These companies have had a certified system of integrated management since 2009, including quality environment and labor protection (ISO, 2007; ISO, 2018b; 2008; 2004).

The company is headed by a board of directors, which reports to the Executive Director General. In total, the company has 236 employees, which are divided into 6 branches: Technical department; department of quality, environment, and safety; administrative and financial department. In this case, 16 technical employees of each department are studied, each of them is responsible for the operator team in accordance with the organization chart of the company. Because the sample was from a limited range of employers and company employees, this study used different approaches to achieve the proposed purpose. There were data for all 16 technicians from the Internet resource. In addition, interview forms were taken with the Director General and the technician responsible for the integrated system (quality, environment, and safety). The analysis of incidents, accidents at work that occurred during the period were analyzed for 2007-2013 years. All affected workers, that is, both technicians and operators were taken into account. The analysis was conducted per workplace in each year under review.

Data on accidents at work were collected by the Department of Health and Safety of the enterprise and the types of accidents reported by employees were obtained. In this example, the analysis of accidents was particularly important, which helped to understand the evolution of occupational accidents over the years by number and severity, linking them to the introduction and maturity of the occupational safety management system (Silva and Jacinto, 2012). Analysis of technicians' perception of IMS and its contribution to health risk management in order to study technicians' knowledge and perceptions of the effectiveness of the risk management process, in the context where the IMS system is implemented, the questionnaire is developed and applied. In the first phase, a comprehensive literature review was conducted to identify variables for inclusion in the analysis. As a result, international standards and empirical studies were taken into account when constructing questions. Prior to the application of the questionnaire for clarity, a question-meaning test procedure, and linguistic terms were carried out, as well as the applicability of the questions and scales with three technicians. Based on this procedure, some issues have been reformulated to increase clarity and understanding (Ovdiuk, 2020).

The final questionnaire was divided into four sections. The questionnaire begins with an initial section of seven questions about general information, which allows you to analyze the results in terms of several aspects, namely gender, age, years of work in the organization, department, function/activity in the company, education, level and number of accidents at work. The second section contained four questions to analyze technicians'

perceptions of the evolution of IMS and its benefits for risk management in the organization. Respondents needed to inform about the degree of their satisfaction with the management system implemented in the company (5-point Likert scale; “1¼ Not satisfied”; “5¼ Very satisfied”). Then, four points of their idea of the motivation of the management system were evaluated: implementation; legislative requirements; reducing occupational risks; reduction of expenses related to occupational health and safety. Responses and scores according to stakeholders were developed as follows (5-point Likert scale; “1¼ Completely disagree” to “5¼ Fully agree”). Their idea of the advantages of the management system in this regard is analyzed in seven indicators (5-point Likert scale; “1¼ Strongly disagree” to “5¼ Strongly agree” (Sklad, 2019). The selected indicators included safety indicators, accident rates and severity, compliance with legal requirements, improving employee safety, improving accident transparency, and raising employee awareness of occupational health and safety. In addition, indicators related to the results of the organization were also identified, including such as improving the profit of the organization as a whole, improving company awareness. In the last question, respondents were asked to classify improvements in occupational health and safety of the management system in their company (5-point Likert scale; “1¼ Very low,” “5¼ Very high”). The third section of the questionnaire was developed to analyze the involvement of both technicians and the management of leadership. In accordance with ISO 31000 (ISO, 2018a), risk management includes three main stages: Risk analysis, risk assessment, and risk control (Sorensen et al., 2007).

At the first stage, the knowledge of technicians about each of these stages was analyzed. Then they were asked to assess the level of performance of risk management activities in the company, according to their own ideas. In the last question of the section, respondents were asked to assess their own contributions to the following steps: Context setting, risk assessment, risk management, risk reporting and consultation, and monitoring and review. All elements were rated on a 5-point Likert scale (for example, “Very low” to “Very high”). In the last section of the questionnaire, respondents were asked about the importance of some actions to improve occupational health, such as effective awareness of workers about risks, effective safety instructions, involving all workers in safety training, and facilitating the participation of workers in the field of health (5-point scale Likert; “1¼ Strongly disagrees” to “5¼ Strongly agrees”). The interview was conducted in a 60-minute semi-structured interview with the Director General and technician, who is responsible for IMS, to better understand the participation and perception of IMS employees and risk management activities. In addition, interviews served to confirm and supplement surveys and the safety of observation data (Klos et al., 2020).

Interviews were conducted individually, with two researchers, one acting as an interviewer and the other responsible for recording the session and the note-taking (Stemn et al., 2018). The interview stage took place according to a predefined protocol. The interviewer asked the following questions: Question one (Q1): How do you characterize the participation of the company's employees in the risk management process? Which of the participants are the employees involved in the process, how does such participation occur? How did this involvement evolve? Question two (Q2): How do you assess the degree of risk perception on the part of the company's employees? Are there differences between the different workers to report? How should this perception evolve? Question 3 (Q3): What contribution is integrated into quality, environment, occupational, health, and safety management to increase or improve employee participation in risk management and risk perception? Interviews were recorded and transcribed word for word.

The accident rate was calculated in accordance with Spanish law (Commission Regulation No. 55/2010, 21<sup>st</sup> of January) and as described below. Injury rate (IFR) is the number of accidents at work per million hours actually worked:  $Rf \frac{1}{4}$  number of accidents at work 106/number of hours effectively worked. Injury severity rate (ISR) reflects the number of work per lost days per million hours actually worked:  $Rs \frac{1}{4}$  the number of lost working days 106/the number of hours effectively worked (Suarez-Cebador et al., 2015).

### 3. Results and discussion

In fact, certification can be a difficult and expensive process in these enterprises, due to the associated costs, lack of motivation of employees, difficulties in changing the enterprise's safety culture, and was developed at the medium-sized enterprise, where the level of accidents over the years of work is analyzed and the idea of risk management is present. For example, the enterprise under study is developing its activities in the field of solid household waste management and was certified in 2009 with IMS for quality, environment, health, and safety. The role of the image of the integration of managing risks in the health system and understanding of the perception of a risk management system is very important in order to transform it into an integrated health system and make a more efficient system. Misperceptions of workers, managers, and other stakeholders on this issue may create obstacles to this process. In addition, perception can also influence risk behavior, which is an important understanding of safety management.

Several factors affecting the perception of health risks are well known, such as the characteristics of the situation, its surroundings, and personal factors such as knowledge, beliefs, values, experiences, feelings, and attitudes. Accordingly, perceptions are

also influenced by human and structural capital. A human capital asset is a reserve of knowledge and skills owned by the enterprise's employees but at the enterprise's disposal for the duration of their contracts (Bonafede et al., 2016; Ksenofontov, 2018). Experience and learning are examples of the elements that make up human capital. Similarly, health and health training, individual ability to anticipate and recognize hazards, ability to respond to emergencies, or employee physical strength are some elements of human capital security.

Structural capital is defined as the combination of knowledge, procedures, and practices that remain in an enterprise even when employees leave it. Working procedures, management mechanisms, and emergency procedures, for example, are all part of structural capital. Meanwhile, formalization of hazardous tasks, risk signaling, investigation, and analysis of accidents form is a part of the protective structural capital. Risk perception is of paramount importance in order to develop an appropriate safety culture. In fact, previous studies have shown that risk perception is a precursor to the safety of climate organizations. The challenge is how to have a positive impact on the organization's health culture (ISO, 2020). Despite the importance of risk perception, the erroneous perception exists and is often reported. Many studies have shown how people tend to reassess high-severity risks. These are usually risks that are considered technologically complex, scientifically unknown, where people unwittingly experience risks that are not controlled by others, where risks or consequences with irresponsibility are considered, or where the risk is remembered as a result of recent accidents (Boustras et al., 2015). Risks that are underestimated tend to be risks of low severity, where exposure is considered voluntary, where risks are scientific in nature and well known, risks that can be controlled or addressed responsibly, where the effects are reversible and the risk is not dramatic. These results suggest that awareness is more about feelings than knowledge or objective risk assessments and prevention efforts and safety measures should take this into account. Perceptions may be more important for WSS (Worldwide Workers Safety System). Despite the accident, the rate will be higher in smaller enterprises due to a decrease in the number of workers employed by enterprises, it may remain without registering an accident for several years. This may have a critical impact on workers' and employers' perceptions of the risk of industrial accidents. In addition, cost measurements increase bureaucracy (Shevchenko, 2019).

One of the main difficulties in implementing management systems is a large amount of human and financial resources spent. In addition, owners and other managers need to solve several tasks in these companies, postponing tasks related to risk management activities to second place. However, it is also important to note that SMEs are often referred to as the only group of firms, while they

may differ mainly in their size and resources, which may also have implications for the risk management system (Jorgensen, 2016). Given the above, this study aims to promote a better understanding of how IMS improves health risk management in medium-sized enterprises. To this end, a case study is conducted, accidents and occupational diseases are also a problem for these organizations, enterprises with smaller sizes report higher restrictions, which are perceived as an economic burden much more than the opportunity to grow (Koustellis et al., 2013).

Health policies and measures to improve occupational health and safety in the world in small businesses should be tailored to its structural, economic, and production characteristics, responding to the need for bureaucratic, administrative, and legislative simplification on the one hand and increasing public investment and economic incentives on the other. Strengthening external advisory and mediation support measures is recommended with increased knowledge and access to funding. Actions should be aimed at changing the attitude of employers toward occupational health and improving the safety culture (Lavoie and Guertin, 2001).

Occupational accidents have a key impact on human decency, create high costs for the social health system/insurance of anyone in the country and worsen the sustainability of society (Nepomnyashchyy et al., 2019). In this case, the analysis of accidents was especially relevant for the context of the development of safety as a result of activities in the organization, since this was previously defined as an indicator of the effectiveness of occupational health in SMEs. It was expected that with the guidance on health care, the system was introduced, the accident rate was decreasing. Thus, accident rates by frequency and severity were calculated.

Data indicate that severity decreased for most years except 2017, 2018, and 2019. The severity in 2018 was only about 1/3 of the severity in 2017, but with some fluctuations in the intervening years. However, the severity increased again in 2019. These fluctuations were also found in injury rates. In 2019, the organization decided to audit the occupational health and safety management system for the first time and then developed practices for improving the system, including several activities to raise awareness from the point of view of occupational safety and health and introduce improvements in the company (alarm, protection of equipment, provision of personal protective equipment (PPE), consultation with employees on General safety of technicians, more detailed risk reviews).

These initiatives have been developed to raise awareness about safety and improve risk perception among all workers. In a company with a management system for occupational safety and security, risk management activities developed by the organization, optimized, for example, inspection



workplace, risk assessment, risk control, risk reporting and consultation, accident registration and analysis, and training safety (Liba et al., 2019; Hryshchuk, 2019).

So, working conditions are improving and the level of perception of risk is increasing, affecting the behavior of workers in the field of safety, and therefore the level. However, when the occupational safety management system was introduced, it is not surprising to observe that at the beginning of the year some indicators worsened, for example, the frequency of injuries. When the occupational safety and health management system is mature, this is a good practice for workers who tend to report smaller accidents than in the past, increasing this indicator (Vinodkumar and Bhasi, 2009). Most of the accidents recorded during the analyzed years resulted in temporary disability, in most cases with leave from 4 to 30 days (40.9%) and a significant value for leave above 30 days (21.9%). According to these results, several recorded accidents of moderate severity, which is the result of the risks to which workers are exposed. In fact, in a waste management company, workers experience several risk factors that can lead to industrial accidents and disease.

The results indicated a reduction in the risks of an accident from 2017 to 2019. In 2017, there was an increase in these values, and in 2018 the results were very close to those obtained in 2019. The increase, which was previously observed in IFR, may explain these results. In total, there were more men than women from the injured workers of the years analyzed (2017-2019). These results are related to the tasks developed. Most women perform functions at a screening station or administrative, while men are assigned to other activities, such as handling, storage, and transportation of waste, physically difficult tasks. The data also showed that, with the exception of 2017 and 2019, there were more accidents that occurred at the facilities (56.0%) than accidents outside the facilities (44.0%). This can be explained by the fact that outside the premises there are only selective collection activities and maintenance of selective disposal; all other activities are performed at the company premises (Yoon et al., 2013; Getman, 2020).

Human errors, including alleged and unintentional actions, are often stated as one of the most important causes of industrial accidents in various situations. In the company under analysis, this was also discovered. The data identified "Non-recognition/distracted" as the most frequent cause of accidents, which is 52.48% of the total number of accidents that occurred during the period under review, and then "non-compliance," which was associated with 33.66% of the total number of accidents recorded.

A few accidents occurred due to the "lack of use of PPE" (8.91%). In general, in this case, there was an improvement in the registration of accidents, which is not necessarily associated with a decrease in the real number of accidents, but there was a decrease in

the severity of the injury. Accidents were also analyzed, taking into account, among other aspects, their distribution by age group, taking into account seniority and experience, time of day, accidents, what happens, causes and consequences, accidents, and the like. Given the age group and seniority of the company, there is a normal distribution, with junior and senior employees and associated with fewer situations. However, more than 75% of accidents occur with employees who have many years of experience in the company (Kalaur and Moskaliuk, 2020).

The distribution of accidents during the day is also a normal distribution, with fewer accidents that occur at the beginning and end of the day. These results show that accidents tend to occur in situations where workers can act more passively and, over time, more absently. Looking at the causes of accidents, we should highlight the fallings, blows caused by objects, and excessive effort, with which 2/3 leads to sprains, injuries, and wounds, as well as about 2/3, affect the hands, upper limbs, head, and eyes. Almost half of the accidents are related to handling materials, machines, and tools, which make up only 15% of the causes of accidents recorded in the period considered.

The IMS system was introduced in 2017 and is still ongoing. Seven years after the company began its implementation, a change in the perception of technicians about the analyzed evolution and efficiency of the system yielded results. The data showed that they were satisfied with the development of the system over the years (56.3%) and classified its development as high in companies (50%) (Zhao et al., 2016). The main advantages of IMS in this regard over General safety of technicians, which were covered by respondents: A significant positive correlation was found between the reduction in the number/severity of emergency work, awareness of employee safety ( $r = 0.599$ ;  $p < 0.05$ ) and compliance with legislation ( $r = 0.655$ ;  $p < 0.01$ ). In fact, the occupational health management system was previously specified by Lelechenko et al. (2020), Diegtiar et al. (2020), and Kuzmenko et al. (2020) to facilitate staff compliance with the law and promote training, knowledge, and awareness of occupational risks.

As a result, a low accident rate is expected. When management systems are implemented, the benefits associated with company visibility with customers and suppliers are expected. In our study, the opinions of technicians on this benefit were divided (50% agree and 50% disagree). However, given the "business" characteristics of the company, it provides an important service to society, having already high visibility among interested parties, which is a common fact of knowledge among technicians (Olca et al., 2021).

The results also show that technicians do not recognize the contribution of the management system to the company's profits.

## 4. Conclusion

The introduction of integrated management systems enables the organization to achieve effective results in reducing risks and improving productivity, providing a better understanding of how management systems affect the management of occupational health risks in the organization, especially in SMEs (municipal). The success of occupational health risk management integration depends on both technical and human aspects. In this study, the analysis of accidents was particularly relevant, helping to understand the evolution of occupational accidents over the years as regards their number and severity, as regards their implementation/maturity of the occupational safety management system.

The results of this study show that although the incidence of accidents has increased since 2009, the severity has been reduced. An analysis of accidents proved that “carelessness/distraction” was a frequent cause of the accident, which is 52% of the total number of accidents followed by “non-compliance,” which was associated with 34% of recorded accidents. According to technicians' ideas regarding IMS and its contribution to health risk management and system development satisfaction for many years (56%), which classified its development as high in the company (50%). Perceptions of the importance of certain activities related to risk management, occupational health, and safety. Most technicians considered that communicating risks to all workers and ensuring proper training is especially important for improving safety and health in organizations. The advantages of the occupational safety and health management system were realized by technicians.

Compliance with legislative requirements was identified as one of the main reasons for the introduction of the labor protection management system. Most of the technicians consulted believed that risk education and training for all workers was particularly important to improve safety and health in the organization. According to the Director General, there was supreme control and strictness in accordance with health legislation and great participation of employees in risk management. Improved management of occupational health and safety risks has resulted in a higher level of involvement of the Director General and employees, better recording of occupational accidents, and reduced severity of injuries. Employee participation and awareness contributed positively to these results. Finally, it has been proven that IMS has brought greater awareness to employees in risk management activities, but their participation has not yet reached the desired level. As for the future, more research is needed to extend to the various SMEs that have implemented integrated management in recent years, which can be useful in confirming the importance of involving workers and the role of management in this process.

## Compliance with ethical standards

### Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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