

Safety climate and occupational hazard management: an analysis from the perspective of employees of the sugar-alcohol sector in the interior of São Paulo

Clima de segurança e gestão de riscos de acidente de trabalho: uma análise sob a ótica dos colaboradores do setor sucroalcooleiro do interior de São Paulo

Clima de seguridad y gestión de riesgos de accidentes laborales: un análisis desde la perspectiva de los colaboradores del sector sucroalcoholero del interior de São Paulo

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ABSTRACT

The aim of this research was to identify employees' perceptions of the safety climate and the management of occupational accident risk in the sugar-alcohol sector. Thus, an online questionnaire survey with closed and structured questions was applied to a sample of 171 respondents, selected for convenience. In the process of analyzing the data, Excel software was used to calculate the percentage probability and show the variable with the highest or lowest percentage occurrence. The results show that the employees' statements indicate that the companies have shown concern for their employees' well-being. 61% of them, for example, stated that occupational safety is a priority for the management of the companies they work for. However, despite these findings, companies need to review their bonus practices, as only 26.9% of the 171 respondents said that bonuses were distributed correctly. This study's contribution to the sector, as an object of analysis, consists of identifying employees' perceptions of the safety climate and the risks of accidents at work that they feel in the organizations to which they belong. It also highlights the importance of the topic for managers, who are faced with the challenge of looking after the physical and mental health of their employees in a sector which, due to its specific characteristics, is outlined by constant danger.

Keywords: motivation, safety, occupational hazard, well-being.

RESUMO

O objetivo desta pesquisa é identificar a percepção dos colaboradores sobre o clima de segurança e a gestão de risco de acidente de trabalho no setor sucroalcooleiro. Para tanto, aplicou-se uma *survey* com questionários *online*, com perguntas fechadas e estruturadas, a uma amostra de 171 respondentes, selecionados por conveniência. No processo de análise dos dados foi utilizado o *software* Excel para calcular a probabilidade percentual e mostrar a variável com maior ou menor escala de ocorrência percentual. Os resultados deixam evidências de que as declarações dos colaboradores sinalizam que as empresas

têm demonstrado preocupação no que se refere ao bem-estar dos colaboradores. 61% deles, por exemplo, declararam que a segurança do trabalho constitui uma prioridade para a gerência das empresas das quais fazem parte. Todavia, notou-se que as apesar desses achados, empresas precisam rever sobre as práticas de gratificações por elas oferecidas, pois dos 171 respondentes, apenas 26,9% apontaram que as gratificações são distribuídas corretamente. A contribuição deste estudo ao setor, enquanto objeto de análise consiste na identificação das percepções dos colaboradores sobre o clima de segurança e os riscos de acidentes de trabalho que sentem nas organizações das quais fazem parte. Destaca-se ainda, a importância do tema para os gestores, que têm em suas mãos o desafio de zelar pela saúde física e mental dos seus colaboradores em um setor que em função das suas especificidades, é delimitado por constante periculosidade.

Palavras-chave: motivação, segurança, acidentes de trabalho, bem-estar.

RESUMEN

El objetivo de esta investigación es identificar la percepción de los colaboradores sobre el clima de seguridad y la gestión del riesgo de accidentes laborales en el sector sucroalcoholero. Para ello, se aplicó una encuesta con cuestionarios en línea, con preguntas cerradas y estructuradas, a una muestra de 171 encuestados, seleccionados por conveniencia. En el proceso de análisis de los datos se utilizó el software Excel para calcular la probabilidad porcentual y mostrar la variable con mayor o menor escala de ocurrencia porcentual. Los resultados evidencian que las declaraciones de los colaboradores señalan que las empresas demostraron preocupación en lo que respecta al bienestar de los colaboradores. Por ejemplo, 61% de ellos declararon que la seguridad en el trabajo es una prioridad para la gerencia de las empresas a las que pertenecen. Sin embargo, se notó que a pesar de estos hallazgos, las empresas necesitan revisar las prácticas de gratificaciones que ofrecen, ya que de los 171 encuestados, sólo 26,9% señaló que las gratificaciones se distribuyen correctamente. La contribución de este estudio al sector, como objeto de análisis, consiste en la identificación de las percepciones de los colaboradores sobre el clima de seguridad y los riesgos de accidentes laborales que sienten en las organizaciones a las que pertenecen. Se destaca también la importancia del tema para los gestores, que tienen en sus manos el desafío de velar por la salud física y mental de sus colaboradores en un sector que, debido a sus especificidades, está marcado por una constante peligrosidad.

Palabras clave: motivación, seguridad, accidentes laborales, bienestar.

1 INTRODUCTION

Issues relating to the safety climate at work can often become significant obstacles to the changes required in the implementation of the Occupational Safety Management System (OSMS), as can be seen in Perim's work (2016). In this sense, Vilar *et al.* (2012)

warns that several sugar-alcohol companies have vulnerable points that could compromise the safety of their employees. According to these authors, the risk of accidents in confined spaces, the lack of more effective actions aimed at preventing and fighting fires and the issue of labor qualification in the manual cutting of sugarcane are some issues that cause concern and require the adoption of more effective measures that are widely used.

A study carried out by Ramos (2019), with the aim of evaluating and critically discussing the occurrence of accidents at work in the sugar-alcohol sector in the state of Goiás, between 2012 and 2017, found that accidents at work and occupational diseases are a public health problem and that the high incidence of accidents at work in the sugar-alcohol sector is still considered a serious public health problem in Brazil and requires interventions to minimize it.

Given the above, the main objective of this research was to identify employees' perceptions of the safety climate and occupational hazard management in the sugar and ethanol sector in the interior of São Paulo. One of the factors justifying this work is the economic and social importance of the sector for Brazil, which is considered the world's largest producer of sugar cane and is of great importance to Brazilian agribusiness (Conab, 2022). In addition, according to the National Center for the Sugar and Biofuel Industry (Ceise Br., 2022), the sugar-energy sector remains a major employer and generator of income, and one of the differences between the sugar-energy sector and other sectors of agribusiness is the high rate of employment, 95%. In agro-industry as a whole, this percentage only reaches 58%.

The importance of the safety climate at work for organizations is also noteworthy. A study carried out by Taşdemir, Caner and Durmaz (2023), with the aim of analysing the effects of safety climate on organizational productive energy, with 426 employees of small and medium-sized textile companies in the Organized Industrial Zone in the Turkish province of Gaziantep, found that safety climate in the workplace positively and significantly affects employees' feelings and productive energy.

There is also the fact that well-being, safety, health and hygiene at work are fundamental to the success of a company due to the various benefits they promote (Coentro, 2018). Thus, Perim (2016) believes that investigating and learning about the

existing safety climate in a company is essential for formulating plans for change, when necessary.

2 THEORETICAL FRAMEWORK

The aim of this section is to discuss some concepts related to the proposed topic, such as: Occupational hazard and safety climate at work (2.1), Agribusiness and the sugar-alcohol sector in the world (2.2) and occupational safety in the sugar-alcohol sector (2.3).

2.1 OCCUPATIONAL HAZARD AND THE SAFETY CLIMATE AT WORK

In an increasingly technological and dynamic world, Bristol (2019) states that occupational safety has become a key tool for labor development. However, Coentro (2018) states that over time, occupational safety, health and hygiene has gained importance in organizations not only because it is a legal obligation, but also because it is seen as a fundamental aspect of maintaining the physical and psychological integrity of workers through better working conditions.

According to an article published on the website of the Social Service of Industry (Sesi, 2021), the constant changes in the social, economic, political and technological scenario in Brazil require companies to adopt increasingly innovative strategies for assertive decision-making when it comes to reducing accidents and occupational illnesses, especially when you take into account that occupational accidents (OA) are one of the biggest public health problems in the world and have a high burden on society as a whole: government, employers and workers (Gonçalves Filho; Ramos, 2015).

The concept of occupational accident adopted in this research is conceived by Brassolatti *et al.* (2017), as something arising from the exercise of work in the service of the company or the exercise of work, causing bodily injury or functional disturbance that causes death or loss or reduction (permanent or temporary), of capacity for work. Risk, in the view of Bocardi and Silva (2023), can be translated as uncertainty about the occurrence or not of a loss or damage, and its control occurs through management.

However, these authors understand that risk management has become one of the main pillars of modern administration. Regardless of the degree of exposure it faces, a company needs to efficiently analyze and manage its risks so that it can reduce its threats and ensure the best use of business opportunities and the sustained growth of its operations.

Occupational safety is understood as "a set of measures adopted with the aim of minimizing or eliminating accidents at work, occupational diseases, as well as protecting the integrity and working capacity of workers" (Bristol, 2019, p. 10). According to this author, occupational safety legislation in Brazil is made up of Regulatory Norms (RNs), complementary laws, ordinances and decrees, as well as international labor conventions.

Rodrigues and Santana (2010) understand that health and safety are essential when the aim is to maintain a healthy and productive working environment. Wunsch Filho (1999) argues that there is a direct relationship between the social dimension of the work process and the occupational accidents and illnesses suffered by individuals in organizations. Besides causing damage to the productive forces, Gonçalves Filho and Ramos (2015) point out that accidents generate expenses, such as the payment of social security benefits, which could be channeled into other social policies. According to Rodrigues and Santana (2010), environmental working conditions are capable of affecting the health, safety and well-being of workers and can cause professional or occupational diseases, depending on certain risks, as shown in Figure 1.

Figure 1 - Indication of occupational risks with their respective colors.

Group I	Group II	Group III	Group IV	Group V
Physical Risks	Chemical Risks	Biological Risks	Ergonomic Risks	Accident Risks
Green	Red	Brown	Yellow	Blue

Source: Rodrigues and Santana (2010, p. 33).

In order to better manage these factors, Rodrigues and Santana (2010) report that in Brazil, the Risk Map was included as Annex IV of Regulatory Standard 5, by means of Ordinance No. 25 of December 29, 1994 and one of its objectives is to gather the information needed to establish a diagnosis of the occupational health and safety situation in the company. These authors warn that occupational risks occur due to precarious

conditions in the work environment or in the operational process of the various professional activities.

According to Flin *et al.* (2000), in recent decades, in industries where significant hazards are present (even if they are rarely perceived), companies, together with their regulatory agencies, have paid considerable attention to assessing safety in the workplace. It is believed that it is essential for companies to also consider issues related to the handling of objects and equipment used in the execution of work, which can also cause accidents.

The safety climate at work, according to Zavareze and Cruz (2010), refers to the shared perception that members of the organization have regarding their commitment to the organization's safety management and safe behaviour at work. It is a strong performance indicator that can provide insights into safety performance before accidents occur in the workplace (Yule; Flin; Murdy, 2007).

In addition, the safety climate is considered to be a crucial factor that can generate high stress loads, which impact the behavior of workers in the workplace. In fact, stress at work is considered to be a probable mediator of the relationship between safety climate and the occurrence of accidents in the workplace (Khoshakhlagh *et al.* 2023).

To demonstrate the relationship between these two constructs, Khoshakhlagh *et al.* (2023) conducted a survey of 1,530 male workers from a petrochemical company in Iran, aiming at investigating the relationship between safety climate, job strain and risk of accidents using structural equation modeling (SEM) in the Analysis of Moment Structures (AMOS) software.

The results of the study carried out by Khoshakhlagh *et al.* (2023) revealed that the latent variable of safety climate with an effect coefficient of - 0.112 had no direct effect on the risk of accidents ($P = 0.343$). However, the safety climate as an effect coefficient of - 0.633 had an indirect effect on the risk of accidents due to job strain ($P < 0.001$). The total job strain score had a significant direct effect (0.649) on the risk of accidents ($P < 0.001$). Among the dimensions of the safety climate, the main variables, management commitment and competence with safety (- 0.108) and commitment to worker's safety (- 0.107) had the highest indirect effect coefficients on the risk of accidents. Among the dimensions of job strain, the greatest indirect effects were from the

variables conflict at work (0.636), physical environment (0.631) and workload and responsibility (0.631), respectively.

Yule, Flin and Murdy (2007) developed a theoretical model to test the relationship between management commitment and the risks faced by the organization's workers. The model tested revealed that the relationship between management commitment and supervisor involvement in risk behaviors was mediated by knowledge and training. In addition, the positive attitude towards risk-taking variable (i.e. not engaging in risky behavior) was related to workers' positive feelings about increased responsibility for safety, especially when it came to senior management commitment.

The organizational climate was also related to the practices of economic and psychological rewards, suggested by Yao, Qiu and Wei (2019), which they believe increase employees' commitment to their continuity in the organization. According to these authors, continuity commitment refers to the perceived economic value of remaining in an organization, while normative commitment is based on the obligation to remain in the organization for moral or ethical reasons. The next section provides an overview of agribusiness and the sugar-alcohol sector in the world.

2.2 AGRIBUSINESS AND THE SUGAR-ALCOHOL SECTOR IN THE WORLD

Over the years, agriculture in Brazil has undergone various processes of transformation, which have influenced the development of agribusiness, with the industrialization of agriculture as its precursor (Rodrigues; Polli, 2020). According to Xuea *et al.* (2024), the agribusinesses play a pivotal role in driving propelling innovation in the field of agricultural science and technology. Thus, the agribusiness sector is increasingly gaining prominence in the midst of the global crisis, due to its essential character for human subsistence, providing food for the entire population, in addition to being a fundamental part of maintaining Brazilian economy (Bortoloti; Silva; Rossaneis, 2021);

According to an article published on the website Inovação industrial (2021), the sugar-alcohol sector is one of the main businesses in Brazilian agro-industry, with Brazil standing out as one of the largest sugarcane producers in the world. The sugar-energy

sector encompasses agricultural and industrial activities related to the production of sugar, ethanol and bioelectricity and has had a major influence on the Brazilian economy since colonial Brazil, which at that time already had a significant market share, with a value as high as that of gold throughout Europe, due to the high demand (Rodrigues; Polli, 2020).

Data presented by the Agricultural Parliamentary Front - FPA (2023) shows that there are currently 367 mills installed in Brazil, grinding approximately 657.4 million tons, making it the 2nd largest producer of ethanol and the 1st largest producer of sugar on a global scale. In financial terms, the GDP of the sugar-energy chain is approximately 2% of the national GDP, with more than 1,000 municipalities participating in its activities and generating more than 700,000 formal jobs. Table 1 below gives an overview of world sugar production.

Table 1- World sugar production.

Brazil	The world's largest sugar producer and expectations are for an increase in Brazil's share of world production and the world market. In the next harvest, the country will account for 23% of supply and 49% of global trade in the product, with a 66% increase in exports.
India	The world's second largest producer with 17% of the total volume produced in the 2019/20 crop year, and also has a large share of the global market.
European Union	The countries that make up the EU account for 10% of world sugar production and are jointly the world's second largest consumer. For the next harvest, production is expected to continue to fall as a result of adverse climatic factors.
Thailand	The second largest sugar exporter in the world, behind Brazil, reduced production in the 2019/20 harvest, a trend that is expected to continue in the next harvest due to unfavorable weather conditions.
Indonesia	The country that imports the most sugar in the world; for the 2020/21 harvest, a small reduction in production is expected, however, with imports growing by at least 19%, stocks should be slightly higher in the country.
China	In the 2019/20 crop year, China was the world's fourth largest sugar producer and second largest importer and in this crop year, despite lower consumption, the country increased imports; there were 264,000 tons more than in the previous crop year; this may have been a reflection of lower production.
United States	The world's third largest sugar importer and seventh largest producer. Production of the sweetener in the country is expected to grow in the next harvest, as a result of the larger area harvested with sugar beet and the better agricultural performance of sugar cane in some producing regions.

Source: Adapted from Vidal (2021, p. 2).

Vidal (2021) believes that Brazil is considered the world's largest producer and exporter of sugar, accounting for approximately 18% of production and 36% of global trade in the product. However, the author reports that in the last two harvests, 2018 and 2019, low prices discouraged production, but in early 2020, sugar prices rose again due

to lower supply in countries like India and Thailand and the devaluation of the real against the dollar, which favored Brazilian exports.

Along the same lines, Ruths, Shikida and Fracaroll (2023) also attest that Brazil is one of the world's largest sugarcane producers, responsible for 20% of world production and 45% of global sugar exports. In fact, this can be corroborated in the sectoral analysis of agribusiness, presented by the Institute of Agricultural Economics - IAE (2022), which shows that in the accumulated result from January to November 2022, when compared to the same period in the previous year, the São Paulo sector showed an increase in exports (+36.0%), reaching US\$23.68 billion, and in imports (+13.3%), totaling US\$4.70 billion; With these results, a surplus of US\$18.98 billion was achieved, 43.1% higher than in the period from January to November 2021, as shown in Figure 1.

The share of São Paulo's agribusiness exports in the state is 37.6%, while the share of sectoral imports is 6.2%. It should be noted that São Paulo's exports in other sectors of the economy - excluding agribusiness - amounted to US\$39.33 billion and imports to US\$70.54 billion, generating an external deficit of this aggregate of US\$31.21 billion. Thus, the IAE (2022) concluded that São Paulo's foreign trade deficit was not higher due to the performance of state agribusiness, of which balance remained positive (US\$18.98 billion).

The six main product groups which, according to the IAE (2022), account for Brazilian agribusiness exports from January to November 2022 are: the soy complex (US\$58.80 billion, of which soybeans account for 77.3% and bran for 16.6%), the meat group (US\$23.78 billion, with beef accounting for 51.0% of this total and chicken 36.8% and pork 9.6%), forest products (US\$15.35 billion, with pulp accounting for 50.6% of cellulose and 33.0% of wood), cereals, flour and preparations (US\$12.33 billion, led by corn grain with an 84.0% share), the sugar and alcohol complex group (US\$11.96 billion, 86.9% of which was sugar) and the coffee group (US\$8.48 billion, 92.2% of which was green coffee). These six groups together accounted for 88.2% of Brazilian sectoral foreign sales.

Despite this positive performance, the IAE (2022) draws attention to the military conflict between Russia and Ukraine, which has had a number of social and economic repercussions, with repercussions all over the world. For the sugar-energy sector, the

main consequence is in the supply of inputs, after all, around 30% of the volume of fertilizers imported by Brazil comes from Russia and Belarus, countries that have suffered strong economic sanctions. The next section discusses occupational safety in the sugar-alcohol sector.

2.3 OCCUPATIONAL SAFETY IN THE SUGAR-ALCOHOL SECTOR

The occurrence of occupational accidents in the industrial processing of sugar cane is a cause for concern because of their potential to reach large proportions and produce injuries of considerable severity. The handling of loads (sugarcane and finished products), operations involving boilers and the production and storage of alcohol stand out in this life-threatening scenario (Silva; Rumin, 2016).

This may be associated with occupational health and safety conditions in Brazil, which, according to Souza, Barros and Filgueiras (2017), are predominantly predatory, and even in the face of intense concealment of health problems, there is a huge number and incidence of illnesses and deaths in the labor market. These authors point out that in meatpacking plants, the increase in work intensity and the application of draconian targets, associated with unprotected machinery, ammonia leaks and other accidental conditions, help explain the tripling of the number of permanently disabled workers between 2006 and 2013.

The sugar-alcohol sector is also a good illustration of the characteristics of occupational illness and the pattern of work management in Brazil. Although manual cutting has been replaced by mechanized cutting in recent years, this technological advance has not eliminated the problem of deaths and illness (Souza; Barros; Filgueiras, 2017). These authors state that in São Paulo, where harvesting is more mechanized, deaths in the mills went from 15 in 2006 to 31 in 2013. Mechanization has not changed what is essential: the way work is organized, with payment by production (as well as frequent outsourcing and excessive working hours), and this helps explain why workers continue to fall ill, but now operating machines.

In the analysis of Vilar *et al.* (2012), the occupational health and safety management system aims to protect workers' health by setting organizational objectives

and targets. However, these authors warn that several sugar-alcohol companies have vulnerable points that can compromise the safety of their employees. They cite, for example, some factors that cause concern and require the adoption of more effective measures which are widely used: risks of accidents in confined spaces, as well as the absence of more effective actions aimed at preventing and fighting fires and the issue of labor qualification in manual sugarcane cutting.

Alarming figures show that every 15 seconds a worker in the world dies from an accident at work or an occupational disease. In this ranking, Brazil is the second country in the G20 in terms of deaths from accidents at work (Basilio, 2021). The author points out that in eight years, 5.6 million illnesses and accidents at work have been recorded in Brazil, generating social security costs of over R\$100 billion. He adds that, among the G20 countries, Brazil ranks second in terms of workplace mortality, only behind Mexico (in first place), with 8 deaths per 100,000 jobs between 2002 and 2020, while the lowest mortality rates were recorded in Japan (1.4 per 100,000), Canada (1.9 per 100,000) and, among South American countries, Argentina (3.7 deaths per 100,000 workers).

In Alagoas, for example, information from Portal G1 (2023) provides an alarming warning: the number of serious accidents at work in 2022 was the highest in the historical series of the Observatory of Health and Safety at Work, which began in 2007. The state recorded 3,395 accidents at work in 2022, of which 2,048 were classified as serious accidents. Compared to 2021, which saw 1,223 accidents of this type, the number of serious accidents at work in the state increased by 67%.

Of the 3,395 accidents at work in Alagoas in 2022, the majority occurred in the following sectors: raw sugar manufacturing (38% of notifications - 15,356 cases), hospital care activities - 10% - 4,103 cases), building construction - 4% - 1,480 cases), retail trade in general merchandise, with a predominance of food products - hypermarkets and supermarkets (4% - 1,441 cases). The occupations with the highest accident rates in the state in 2023 were: sugar cane worker (25% - 9,185 cases), nursing technician (6% - 2,229 cases) and finally, construction worker (4% - 1,272 cases).

Ramos (2019) points out that with regard to the health and safety of workers in the sugar-alcohol sector, there is still a lot to think about, do and improve. Among the suggestions made by the author are continuous training, monitoring compliance with

Regulatory Standard 5, as well as constant incentives for employees to use protective equipment.

Clivatti (2019) draws attention to the fact that, regardless of the region, SHO professionals have to pay close attention to the industrial activities carried out by workers. In addition, the author believes that it is necessary and fundamental to establish appropriate procedures, map the risks and promote awareness, especially among male workers, since statistics show that they suffer more accidents at work. The next section discusses the procedures adopted in this research.

3 METHODOLOGY

Given the aim of this study was to identify employees' perceptions of the safety climate and occupational hazard management in the sugar and ethanol sector, the first phase was exploratory research, aiming at broadening understanding of the subject under study, as recommended by Vergara (2006). Research is classified as exploratory when it aims to acquire specific knowledge of the area, getting familiar with the subject, systematizing it in order to build hypotheses (Gil, 2008).

In the second phase of the study, a survey was carried out using online questionnaires with closed and structured questions, since the questions followed the same structure for all respondents (Matar, 2007).

Given the ease of access to the study's potential respondents, university students from a public institution in the interior of São Paulo were selected, who received a link to access the questions via WhatsApp between September and December 2021. The pre-requirement for taking part in the survey was that at the time of data collection, the target audience of the study was working in companies in the sugar and ethanol sector and was of legal age, thus constituting a convenience sample. A total of 171 valid responses were obtained.

In order to measure employees' perceptions of the safety climate and occupational hazard management, the Likert scale was chosen, which is easy for the respondents to understand and easy for the researcher to construct. It is an ordinal scale, i.e. a non-metric

scale in which the variables can be ordered according to the respondent's agreement with the statements presented (Hair Júnior *et al.*, 1998).

The first part of the survey consisted of 10 questions related to the object of study. The variables were based on those adapted from the model proposed by Giuliani and Leite (2019). The second and final part was made up of 7 questions related to the profile of the respondents, such as gender, length of experience, academic background and applicability of risk management, which did not require them to be identified by name.

According to Hair Junior *et al.* (1998), when statistical techniques are used to analyze the data collected through a survey, the sample size should be between 10 and 20 times the number of variables included in the survey instrument. Therefore, it was decided that the sample for this study should consist of at least 170 respondents. Thus, the sample size presented here complies with this author's recommendations.

Following the recommendations of Richardson *et al.* (2008), the descriptive quantitative research method was the most appropriate way to quantify the data collected in the second phase of this study. Percentage probability was used to analyze the results, since the aim was to identify which variable had the highest or lowest percentage occurrence. To do this, Excel software was used to calculate the percentage probability and show the variable with the highest or lowest scale of percentage occurrence, in order to create indicators for summarizing the information, using the percentage statistical probability (P), according to the expressions suggested by Silver (2000):

$$P = \frac{A \times 100}{T} \quad (1)$$

where:

P= Percentage statistical probability;

A= Number of responses to a given variable on a given attitude scale;

T= Total number of questionnaires applied for each course analyzed.

According to Larson and Farber (2004), the percentage probability is based on observations obtained from probabilistic experiments, i.e. it is the relative percentage frequency of the event considered. The scales used in this study are events that reflect the different variables analyzed to identify employees' perceptions of safety and risk management in the event of an accident at work. Hence, it is possible to check which variable, and for which course analyzed, has the highest and/or lowest percentage attitude scale.

The scales used in this study are events that reflect the different variables analyzed to identify employees' perceptions of safety and occupational hazard management in the event of an accident at work. Therefore, it is possible to check which variable, and for which course analyzed, has the highest and/or lowest percentage attitude scale. The next section discusses the results obtained in the study.

4 RESULTS AND DISCUSSION

4.1 CHARACTERIZATION OF RESPONDENTS

Of the 171 respondents, it was observed that 50.88% are men and 49.12% are women; 39.18% are married, 46.2% are single, 11.7% have a stable relationship, followed by those who declared they were divorced (2.34%) and had another type of relationship (0.58%). It was also noted that this is a relatively young group, as the majority are between 18 and 25 years old (36.84%). 22.22% are over 40 years old, 15.79% are between 31 and 35 years old, while 14.04% are between 26 and 30 years old and only 11.11% are between 36 and 40 years old.

As for the length of time they have worked for the company, the results showed that the respondents are relatively long-serving employees, with 33.92% having worked for the company for more than 5 years at the time of data collection.

4.2 PERCEPTION OF SAFETY AND OCCUPATIONAL HAZARD MANAGEMENT

The statements regarding employees' general perceptions of safety and occupational hazard management are shown in the Table 1 and discussed below.

Table 1 - Perception of safety and risk management of accidents at work.

Variables	Percentage (%)						
Occupational safety is a high priority for the company's management.	1,17	1,17	2,34	5,26	12,28	15,79	61,99
Management provides equipment to prevent accidents from occurring in the workplace.	0,58	3,51	4,68	7,02	9,94	23,98	50,29
There is management activity to improve safety in your workplace or reduce your safety problems.	4,68	3,51	8,77	10,53	16,96	18,13	37,43
Management is concerned about the well-being of its employees in relation to safety at work.	1,17	2,92	5,26	8,19	12,87	23,98	45,61
There is management involvement in safety training.	6,43	4,09	6,43	13,45	15,20	18,13	36,26
Before making any decisions on safety-related issues, management seeks the opinion of the company's employees.	12,28	7,60	8,77	15,20	18,13	10,53	27,49
There is employee involvement in the company's occupational safety promoted by management.	5,26	5,26	5,26	12,28	18,33	19,88	33,92
Employees are rarely recognized by management for good safety conduct.	10,53	6,43	11,7	15,2	14,62	19,3	22,22
Employees involved in safety-related accidents are punished by management.	29,82	17,54	12,8	14,04	8,77	5,85	11,11
Employees are blamed by management for making mistakes, whether or not incidents occur.	32,75	11,70	7,60	14,04	14,62	7,60	11,70

Source: prepared by the author, based on field research data, 2021.

The data in Table 1 shows that the company's management has shown concern for the well-being of employees, since more than 61% of them declared that occupational safety is a priority for the company's management. This is an important indicator because it reflects on the employees' perception of the companies' commitment to safety management, which evidently gives them a greater sense of the safety climate at work (Zavareze; Cruz, 2010; Yule; Flin; Murdy, 2007). Data relating to perceptions of supervision and risk management are shown in Table 2.

Table 2 - Perception of supervision and occupational hazard management.

Variables	Percentage (%)						
The supervisor mostly goes around the workplace inspecting his or her employees.	7,60	4,09	8,77	11,70	18,71	16,37	32,75
The supervisor inspects employees' safety-related behavior.	5,26	4,68	8,77	13,45	16,37	19,30	32,16
The supervisor reports cases or shares safety-related experiences with his/her employees in the workplace.	7,02	6,43	7,02	12,28	19,30	16,96	30,99
Team members have a harmonious atmosphere with each other.	3,51	2,34	4,09	14,62	21,64	18,13	35,67
There is good interpersonal relationship at work.	0,58	2,92	4,68	11,11	20,47	23,98	36,26
Development of new safety procedures and policies is the responsibility of management.	2,92	2,34	5,85	12,87	18,71	16,37	40,94
The effectiveness of the safety system is frequently evaluated by management.	5,85	7,02	7,60	14,04	14,62	18,71	32,16
Employees are committed to identifying problems and suggesting solutions.	4,68	4,09	8,19	16,37	16,96	19,30	30,41

Source: prepared by the author, based on field research data, 2021.

Looking at Table 2, it is possible to see that the data indicates significant supervisory involvement with the work team. For example, 32.16% stated that the supervisor inspects employees' safety-related behavior. These results indicate that the actions taken are in line with the premises of Coentro (2028) and Flin *et al.* (2000), regarding concern and attention that companies have given to assessing safety in the workplace.

As supported by Khoshakhlagh *et al.* (2023), the management of accident risks in companies is fundamental. The absence of a safety climate can generate high stress levels, which have an impact on employee's behavior and also on the occurrence of accidents in the workplace.

As the occurrence of accidents at work in the industrial processing of sugar cane has the potential to cause injuries of considerable severity that threaten the lives of workers, Silva and Rumin (2016) recommend proportional increases in concern with the adoption of actions that go beyond investments in technologies aimed solely at increasing company productivity. Thus, the adoption of strategies aimed at developing safer attitudes and behavior, capable of reducing the frequency of accidents, are strongly recommended by Sesi (2021). Table 3 shows the results for safety training and accident risk management.

Table 3 - Safety and accident risk management training

Variables	Percentage (%)						
Employees receive adequate training when they start working in a complex area, when they change jobs or when a new technique is being used by the company.	6,43	5,26	7,02	12,28	13,45	16,96	38,60
Employees are encouraged by management to take part in occupational safety training programs.	8,19	5,26	4,68	8,19	15,20	18,71	39,77
Safety rules are reviewed periodically by the supervisor.	8,77	5,85	5,26	13,45	15,20	18,71	32,75
Activities related to occupational safety training are regularly carried out in the workplace under the responsibility of the supervisor.	8,77	7,02	3,51	15,20	16,37	12,28	36,84

Source: prepared by the author, based on field research data. 2021.

Consequently, Vilar *et al.* (2012) point out that the occupational health and safety management system at work aims to protect workers' health by setting organizational objectives and targets. Some factors that cause concern and require the adoption of more effective measures need to be extensively reviewed, such as: risks of accidents in confined spaces, lack of more effective actions aimed at preventing and fighting fires.

In general, data in Table 3 show that, in the opinion of the respondents, company managers seek to promote employee's involvement in activities related to safety and accident prevention, such as constant training and talks to raise awareness of the importance of physical and psychological safety in the workplace, thus corroborating the premises of Rodrigues and Santana (2010), who consider health and safety to be essential when the aim is to maintain a healthy and productive workplace.

This engagement and cultural involvement with safety concerns on the part of management is a positive point for ensuring resources and commitment from the teams, without any kind of punishment in the event of accidents. Actions like these foster healthy coexistence in the organization. In this sense, Rodrigues and Santana (2010) believe that environmental working conditions are capable of affecting health, safety and well-being of workers and can cause occupational diseases. The perceptions related to the bonuses offered by the companies can be seen in Table 4.

Table 4 - Perceptions of the bonuses offered by companies

Variables	Percentage (%)						
Bonuses are distributed correctly.	11,70	4,68	8,77	18,13	14,04	15,79	26,90
The bonuses are in line with the employee's work commitment.	11,11	5,26	7,60	18,71	13,45	18,13	25,73
Employees are enthusiastic about their work.	6,43	1,17	6,43	19,88	21,05	19,88	25,15
People progress as quickly in this company as they would in others.	11,70	4,68	4,68	19,30	22,22	14,04	23,39
The employee is satisfied with their chances of being promoted.	9,94	4,68	7,60	20,47	18,71	14,04	24,56

Source: prepared by the author, based on field research data, 2021.

Looking at Table 4, it can be seen that there is recognition of employee's performance by the leadership, which encourages employee's satisfaction and commitment to their work, aiming to be promoted within the company. However, the results show that companies need to review the reward systems they have adopted. Of the 171 respondents, only 26.9% pointed out that bonuses are distributed correctly. According to Yao, Qiu and Wei (2019), in order to have a healthy and motivated work environment, all companies need to consider economic and psychological reward practices.

According to Souza, Barros and Filgueiras (2017), although manual sugarcane cutting has been replaced by mechanized cutting in recent years, this technological advance has not eliminated the problem of deaths and illnesses in the sugar-alcohol sector, and mechanization has not changed what is essential: the way work is organized, with payment by production (as well as frequent outsourcing and excessive working hours), which helps to explain why workers continue to fall ill, now operating machines. The final considerations of this study are presented in the next section.

5 CONCLUSION

At the end of this study, which aimed to identify employees' perceptions of the safety climate and occupational hazard management in the sugar-alcohol sector, it was possible to make some conclusive analyses. It was found, for example, that Brazil is one of the world's largest producers of sugar cane, and that the sugar-alcohol sector has been

technologically modernizing its production every year in order to maximize its production efficiency.

On the other hand, the literature review found that occupational health and safety conditions in Brazil are still predatory and that, despite the technological advances that have taken place in the sugar-alcohol sector, these technological advances have not eliminated the problem of worker's death and illnesses and the huge number and incidence of illnesses and deaths in the labor market.

In an increasingly technological and dynamic world, occupational safety has become a key tool for labor development and also for creating a climate of safety that is favorable to workers' mental health, factors that affect the company's operational productivity, no matter how technologically equipped the company is.

Given the importance of these factors, attention to safety, health and hygiene at work has been gaining importance in organizations not only because it is a legal obligation, but also because it is seen as a fundamental aspect of maintaining the physical and psychological integrity of workers, in order to provide better working conditions for their employees. This was evident in the findings of this survey, which showed that of the 171 respondents, 32.16% stated that the supervisor inspects employees' safety-related behavior.

It was also possible to verify that, although the employees' statements show that companies have shown concern for the well-being of their employees and 61% of them stated that work safety is a priority for the company's management, it was noted that companies need to review the bonus practices they offer, since only 26.9% pointed out that the bonuses are distributed correctly.

It was also found that the leadership needs to be closer to their team members, actively participating in the work environment to motivate and encourage the team, and or using a system to recognize the highlights of the staff involved and engaged in the safety processes. With regard to employee training, it was possible to identify the involvement and engagement of the operation in this training process with the aim of maintaining a healthy and productive work environment with quality.

It should be noted, however, that despite the respondents' perceptions of the investments being implemented by the companies, there is still a lot to think about, do

and improve, not just in the sugar and ethanol sector, but in all sectors of the economy. It is therefore believed that continuous investment in training, as well as risk mapping and the provision of appropriate protective equipment for each sector of the company. Finally, it is also believed that the constant promotion of awareness-raising talks on the regular use of protective equipment are fundamental factors in reducing the risk of accidents at work and increasing workers' quality of life.

As with most scientific studies, this one also encountered some limitations/difficulties. One of them refers to the total number of participants in the study: although the number of respondents meets the sample size requirements, it is still believed that a larger sample would provide a greater insight into the object studied.

Another limitation was the willingness of people to take part in the study: the idea was that it would be possible to get a considerable number of respondents in 30 days. However, less than 50 people responded within this period. For this reason, the link to the questions was available from September to December 2021. In view of these restrictions, this research should be reapplied in a broader context, with a larger sample that includes other units of analysis and not just a single educational institution, as it was done in this study.

Despite the limitations identified here, a managerial contribution of this research could be the discussion of the aspects and performance of the integrated safety management system in Brazilian companies, using the best of each to improve risk management control tools in the workplace. In addition to the managerial contribution, this study also makes a valuable academic contribution, through the framework of references presented here, which can serve as inspiration for the implementation of further research on the subject studied.

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