Challenges in the regulation of occupational risk management in Brazil

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Abstract
Occupational accidents and illnesses pose a serious public health issue in Brazil. Recognizing this, Brazilian government authorities have acknowledged the need to implement measures to improve environmental work conditions, and equipment control, and promote occupational safety and health. The complexity of workplace health and safety in Brazil is partly due to the country's diverse range of companies, which vary in technological levels, sizes, motivations, resources, and competencies, with the majority being micro and small enterprises (MSEs). This study aims to investigate whether the strategy adopted by Brazil since 2022 to regulate occupational risk management and promote occupational health and safety has been complied with by companies. To achieve this, all notices of violation related to occupational risk management were analyzed from January 2022 to June 2023. In total, 5,547 cases of violations were examined. In total, 5,547 cases of violations were examined. It was concluded that the occupational risk management regulation strategy alone is insufficient, as many companies have not implemented these measures. There is a need to improve labor inspection services. Safety and health regulatory bodies should be strengthened to consistently and thoroughly conduct workplace inspections and ensure compliance with regulations. Additionally, increasing fines for non-compliance with occupational safety and health regulations is imperative. Public policies and interventions encouraging MSEs to adhere to occupational risk management and invest in workplace improvements are essential.
Keywords: occupational accident; occupational risk; regulation; risk management.

Desafios na regulação da gestão de risco ocupacional no Brasil

Resumo
Os acidentes de trabalho e as doenças ocupacionais são um grave problema de saúde pública no Brasil. Diante disso, as autoridades governamentais brasileiras entenderam que algumas medidas devem ser implementadas para melhorar as condições nos ambientes de trabalho, o controle dos equipamentos e promover a segurança e a saúde no trabalho. No Brasil, a saúde e a segurança no trabalho são complexas. Uma das razões é que o país possui uma grande diversidade de empresas, com diferentes níveis tecnológicos, tamanhos, motivações, recursos e competências, sendo a maioria micro e pequenas empresas (MPEs). O principal objetivo deste estudo é investigar se a estratégia adotada pelo Brasil para regulamentar a gestão de riscos ocupacionais desde 2022, visando promover a saúde e a segurança no trabalho, tem sido cumprida pelas empresas. Para isso, foram analisados todos os autos de infração associados à gestão de riscos ocupacionais desde janeiro de 2022 até junho de 2023, em um total de 5.54. Conclui-se que a estratégia de regulamentação da gestão de riscos ocupacionais, por si só, não é suficiente, pois a gestão de riscos ocupacionais não foi implementada por um número considerável de empresas. São necessárias medidas para melhorar o serviço de inspeção do trabalho. Os organismos reguladores da segurança e da saúde devem ser reforçados para efetuar inspeções constantes e consistentes nos ambientes de trabalho e verificar o cumprimento das regulamentações. É também imperativo aumentar o valor das multas associadas ao descumprimento das normas de segurança e saúde no trabalho. Devem ser criadas políticas públicas e intervenções que incentivem as MPEs a cumprir a gestão de riscos ocupacionais e a investir na melhoria do local de trabalho.
Palavras-chave*: acidente ocupacional; gestão de risco; regulação; risco ocupacional.*

1 Introduction

Occupational accidents and illnesses are a serious public health problem in Brazil. As shown in Figure 1, there were more than 603,825 occupational accidents (including work-related illnesses and injuries) in 2023. Over the past two decades, an average of 604,561 occupational accidents have occurred annually. During the same period, there were an average of 2,607 deaths per year, indicating that seven workers died every day due to workplace accidents (Figure 2). Additionally, the sectors with the highest incidence are construction, mining, transport, and agriculture (Brazil, 2022, SMARTLAB, 2024).

Figure 1 – Number of occupational accidents in last two decades in Brazil

Source: ILO (2024)

Figure 2 – Number of fatal occupational accidents in last two decades in Brazil

Source: ILO (2024)

The Brazilian concept of occupational accidents is very broad. For example, an accident that occurs during the commute from home to work and back, without any lost time is considered an occupational accident. However, such accidents are not deemed occupational accidents by the International Labour Organization (ILO) and the European Union (EU), where only occupational accidents resulting in more than three days of lost time are counted (EUROSTAT, 2013; ILO, 2023). Additionally, each country has its system, and national systems are usually poorly standardized (Takala *et al.*, 2014). These methodological differences explain why the ILO recommends caution when comparing occupational

accident data from different countries, making international comparisons difficult. The most reliable data for comparisons is therefore the fatality occupational rate (Takala *et al.*, 2014).

Table 1 shows the fatality occupational accident rates in Brazil and some developed countries. The Brazilian rate is 7.4 per 100,000 workers, meaning that for every 100,000 Brazilian workers, more than seven have died due to workplace accidents. This rate is about ten times higher than that in Finland (0.7), the United Kingdom (0.8), and the Netherlands (0.5). It is seven times higher than the fatality rate in Denmark and Germany (1.0) and more than three times higher than in Austria (2.0), Belgium (2.3), France (2.6), Italy (2.4), and Spain (2.1). When compared with South American countries (Table 2), Brazil has one of the highest fatality occupational accident rates in the region.

Table 1 – Fatality accident rates in Brazil and some developed countries

Country	Occupational fatalities per 100,000 workers
Brazil	7.4
Austria	2.0
Belgium	2.3
Denmark	1.0
Finland	0.7
France	2.6
Germany	1.0
Italy	2.4
Netherlands	0.5
Portugal	3.5
Spain	2.1
Switzerland	1.3
United Kingdom	0.8
United States	5.3

Source: ILO (2024)

Table 2 – Fatality accident rates in Brazil and South American countries

Country	Occupational fatalities per 100,000 workers
Brazil	7.4
Argentina	3.3
Chile	3.1
Colombia	0.0
Chile	3.1
Turkey	6.3
Uruguay	3.7

Source: ILO (2024)

Given the large number of occupational accidents and illnesses, Brazilian government authorities recognize that measures should be implemented to improve work environment conditions, and equipment control, and to promote occupational safety and health. As a result, they decided to regulate occupational risk management in 2022 (Brazil, 2024a). However, this decision has faced criticism. First, from those who oppose any form of government regulation, and second, from those who believe that while regulation of occupational risk management is necessary, it is insufficient due to gaps and failures that may hinder its implementation by companies.

The main aim of this study is to investigate whether the strategy adopted by Brazil since 2022 to regulate occupational risk management and promote health and safety at work has been complied with by

companies. From this investigation, the authors intend to propose additional measures to ensure appropriate risk management, thereby improving work environments and reducing the incidence of occupational accidents and illnesses.

The rest of this paper is structured as follows: arguments for and against occupational safety and health regulations are discussed in Section 2 within the Brazilian context. The Brazilian strategy for occupational risk management is detailed in Section 3, with a specific focus on Regulatory Norm 1, which concerns occupational risk management. Materials and methods are described in Section 4. Results and discussion on the difficulties, weaknesses, limitations, and challenges regarding the Brazilian strategy for occupational risk management are presented in Section 5. Finally, the conclusion and future works are outlined in Section 6.

2 Occupational safety and health regulations

Arguments in favor of occupational safety and health regulations suggest that without state intervention, workers may not have adequate protection from health and safety hazards in the workplace (Guasch; Hahn, 1999). Legislation compels employers to manage occupational risk, thereby ensuring the health and safety of employees and preventing occupational accidents and illnesses (Rikhotso; Morodi; Masekameni, 2022). Moreover, the correct application of legislation in companies can prevent, control, or even diminish undesired events (Jacinto *et al*., 2010). From this perspective, legislation plays an important role in occupational health and safety management (Ncube; Kanda, 2018; Salguero-Caparrós et al., 2020). Additionally, Ashby and Diacon (1996) argue that "labor market forces are largely ineffective in motivating occupational risk reduction by companies, so government regulations are necessary to protect employees against excessive levels of workplace risk."

However, according to Hale, Borys and Adams (2015), in some countries, there is a consensus that occupational health and safety regulations can stifle industrial innovation and the development of new products and processes. Additionally, there are complaints, particularly from medium and small companies, that compliance with detailed and prescriptive regulations incurs additional costs and the burden of record-keeping. These costs may reduce competition among companies and raise prices for products and services (Hale; Borys; Adams, 2015; Salguero-Caparrós *et al*., 2020). Furthermore, Hale, Borys and Adams (2015) state that when every company is required to adopt the same detailed strategy, it becomes challenging to determine if another strategy might be more effective.

2.1 Brazilian context

The alarming number of occupational accidents and illnesses in the 1970s in Brazil prompted a demand for action from the Brazilian Federal Government (BFG) to improve workplace safety and health. In 1971, 1,325,410 occupational accidents were reported. This number reached 1,916,187 in 1975 (Veloso, 2017). In response, the BFG issued twenty-eight Regulatory Norms (RNs) concerning occupational health and safety in 1978. These norms are enforced and must be followed by all companies with employees, regardless of their nature or size.

Since 1978, the RNs have been updated and expanded. Currently, thirty-six RNs are covering a wide range of occupational health and safety subjects. For example, RN 6 concerns Personal Protective Equipment, RN 7 pertains to the Occupational Health Control Program and RN 9 deals with the Environmental Risk Prevention Program. Table 3 lists ten of the thirty-six RNs, which are detailed and prescriptive. The updating and development of RNs are carried out by a Tripartite Commission, comprising representatives of employees, employers, and the government.

Table 3 – Example of Brazilian Regulatory Norms

Regulatory Norm (RN)	Concerning
RN 1	General Provisions

RN 2	Prior Inspection
RN 3	Work Stoppages
RN 4	Specialized Services in Occupational Safety and Health
RN 5	Internal Commission on Accident Prevention
RN 6	Personal Protective Equipment (PPE)
RN 7	Occupational Health Control Program
RN 8	Buildings
RN 9	Environmental Risk Prevention Program
RN 10	05/05Electrical Safety – Installations and Services

Source: Brazil (2023)

To ensure compliance with RNs, a dedicated Secretariat of Labour and Inspection (SLI) was established, subordinate to the Ministry of Labour and Employment[1]. The SLI is the Brazilian Federal Labour Inspection Authority, comprising labor inspectors who ascertain companies' compliance with RNs. In cases of non-compliance, companies are fined. Additionally, when occupational accidents occur, labor inspectors investigate and report any non-compliance identified during the investigation. Inspectors must determine whether any cause associated with the accident can be attributed to legal noncompliance or omission.

3 Brazilian strategy for occupational risk management

As described in subsection 2.1, despite having occupational health and safety regulations since 1978 and thirty-six RNs, the number of occupational accidents remains high in Brazil. One reason for this is that employers do not adequately manage occupational risks. Therefore, the BFG decided to update RN 1 to include a legal obligation for companies to implement occupational risk management (Brazil, 2024a). The new RN 1 (Brazil, 2024b) is prescriptive, detailed, and bureaucratic.

3.1 Scope of coverage

All companies are now obliged to implement Occupational Risk Management (ORM). However, there are some exceptions. For example, small businesses classified as risk degree 1 and 2, according to Brazilian legislation, are not obliged to implement ORM as long as they declare that they do not identify any chemical (e.g., dust, chemical product exposure), physical (e.g., noise, hand-arm vibration, high pressure, hot or cold climate), or biological (e.g., viruses, parasites, bacteria) hazards at the workplace where they carry out their activities.

Furthermore, when many companies carry out their activities in the same place, where each one of them generate a different kind of occupational hazard, all of them have to implement occupational risk management together. Additionally, companies have to communicate existing occupational hazards in the work environment under their responsibility to outsourced companies. On the other hand, the hired companies have to report the occupational hazards generated by them to the hiring companies. Equally, companies that have employees who work on the premises of other companies, for example, as maintenance contractors from staffing agencies, have to guarantee the health and safety of their workers while they are at that workplace.

Furthermore, when multiple companies operate in the same location, each generating a different kind of occupational hazard, all must implement occupational risk management together. Additionally, companies must communicate existing occupational hazards in their work environment to outsourced companies. Conversely, hired companies must report the occupational hazards they generate to the hiring companies. Similarly, companies with employees working on the premises of other companies, such as

[1] Available at: https://www.gov.br/trabalho-e-emprego/pt-br. Accessed on: 01 Jun 2024. In Portuguese.

maintenance contractors from staffing agencies, must ensure the health and safety of their workers while they are at that workplace.

3.2 Steps for occupational risks management

Companies are required to conduct a preliminary identification of occupational hazards before their activities or new installations begin operation. Furthermore, when there is a process change or a new process is introduced, preliminary identification of occupational hazards must also be conducted. First, companies must aim to eliminate occupational hazards in the work environment. If this is not possible, they have to follow the steps shown in Figure 3 to implement occupational risk management.

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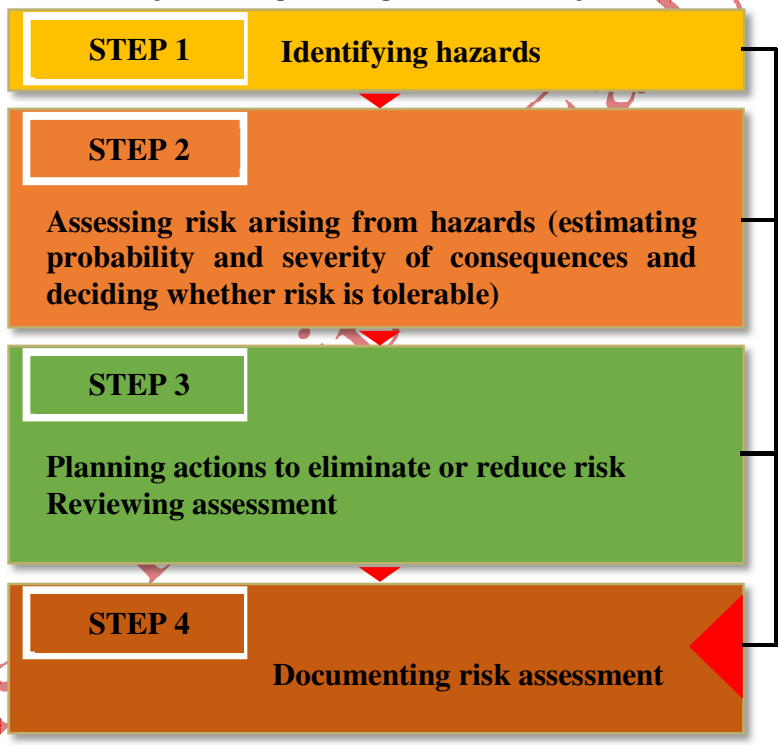
Figure 3 – Steps to occupational risk management



Source: adapted from EASHW (2024)

The first step is occupational hazard identification. RN 1 defines a hazard as “a source that has the potential to cause harm or ill-health. This is an element that alone or in combination with another has the intrinsic potential to give rise to harm or ill-health”. Companies must identify all types of hazards in the work environment, including accidents (e.g., slippery surfaces, moving parts of machines, electrical installations), ergonomic issues (e.g., work involving poor posture, lifting or carrying loads), psychological risks (e.g., stress, violence, and harassment), and environmental hazards (chemical, physical, and biological). Companies must also identify the source of the hazard, the group of employees exposed to it, and the potential health problems these hazards may cause.

The second step is to assess the occupational risk arising from each identified hazard in Step 1 and then indicate the occupational risk level. The following step is to classify the occupational risk according to the risk level to decide whether the risk is tolerable and requires preventive measures. If so, the fourth step is to implement preventive measures for the hazard, following the classification order of the risk level. For example, a high-level occupational risk takes priority over a medium-level risk. Occupational risk assessment (Step 2) is described in greater detail in subsection 3.3.

3.3 Occupational risk assessment

As mentioned in subsection 3.2, companies must undertake the risk assessment arising from each identified occupational hazard in the work environment. The risk assessment is determined by a combination of the severity of an injury or illness and the probability of this injury or illness occurring as a result of exposure to a hazard.

To establish severity, companies must consider the magnitude of the consequence of an injury or illness and the number of workers that could be affected. To determine probability, they must consider whether preventive measures have already been implemented, which may reduce the likelihood of an injury or illness occurring.

3.4 Preventive measures and action plan

If a risk is assessed as requiring a preventive measure, RN 1 dictates that these measures follow a specific order of priority: i) eliminate the hazard; ii) minimize the hazard and control it through collective protective measures; iii) minimize and control the hazard through organizational measures; iv) reduce the risk through appropriate personal protective equipment. Additionally, companies must develop an action plan presenting the preventive measures to be implemented and an execution schedule.

3.5 Risk management program

The identification of occupational hazards and the risk assessment process, including the criteria adopted in the risk assessment and decision-making on the need for preventive measures, must be documented by companies in a document called the occupational risk inventory. Both the occupational risk inventory and the action plan constitute the Risk Management Program (RMP) of companies. The RMP operationalizes occupational risk management and should be available at all times for workers, their representatives, and labor inspectors.

4 Materials and methods

When labor inspectors conduct inspections at companies in Brazil and identify non-compliance with any RN (Regulatory Norm), they are required to issue a notice of violation to the company. This notice details the non-compliance, including when the violation occurred and the type of enterprise (e.g., micro, small, medium, or large). The notice must be entered into the Auditor System by the inspectors, who have exclusive access and must use a personal and non-transferable password. The Auditor System was developed to control and monitor violations. Labor inspectors can extract data on violations from the Auditor System for analysis. The second author of this study is a labor inspector and extracted the necessary data from the Auditor System for analysis.

In this study, all notices of violation associated with RN 1 from its enforcement in January 2022 to June 2023 were selected for analysis. This period represents the time RN 1 has been in force. The authors read all selected notices of violation and extracted the following data: i) description of non-compliance with RN 1; ii) type of enterprise that did not comply with RN 1; and iii) the minimum and maximum value of the fine associated with non-compliance. No specific tool was used for data extraction; the authors manually read the notices and extracted the relevant data. The extracted data were analyzed using descriptive statistics.

5 Findings and discussion

This study aims to investigate whether the strategy adopted by Brazil since 2022 to regulate occupational risk management and promote health and safety at work has been complied with by companies. To do this, compliance with RN 1 by companies was investigated. This section presents and discusses the findings extracted from violation data.

5.1. Non-compliance with occupational risk management regulation

Table 4 shows the seven most common reasons for non-compliance with RN 1. A total of 5,547 notices of violation were issued by labor inspectors, representing 22.5% of all notices of infringement related to occupational safety and health during the investigated period (from January 2022 to June 2023). As shown, non-compliance related to the action plan is the most frequent issue, with 1,330 notices issued for companies not complying with the requirement to develop an action plan. This indicates that while these companies performed risk assessments and classified risk levels, they failed to create action plans to mitigate them.

Table 4 – Non-compliance with RN 1 and number of notices of violation

Violation	Number of notices of violation
The company did not develop an action plan	1330
The company did not implement Occupational Risk Management (ORM)	990
The company did not identify all types of hazards in the work environment	973
The company did not record in the occupational risk inventory the identification of hazards and risk assessment process	873
The company did not adopt preventive measures to reduce risk levels	505
The company did not consider existing preventive measures when determining the probability of hazards	449
The company did not undertake the risk assessment for each identified occupational hazard	427
Total	5547

Source: research data

More concerning is the second most common violation: complete non-compliance with occupational risk management. In other words, 990 companies did not perform the steps outlined in subection 3.2. This is particularly serious because these companies have been aware of their obligation to manage occupational risks since March 2020, when RN 1 was published, even though it only came into force in January 2022. Therefore, lack of time or awareness cannot be considered a valid excuse for their non-compliance. Additionally, it is important to note that the actual number of non-compliances may be even higher, as the vast majority of companies are not inspected due to the poor state of the labor inspection service.

Currently, there are 1,940 labor inspectors in Brazil, only 53% of the total number prescribed by law (3,644). This is the lowest number of inspectors in thirty years (SINAIT, 2023), primarily due to retirements and the Brazilian Federal Government's failure to hire new inspectors. The last recruitment was in 2013. Consequently, the labor inspectorate cannot adequately cover the nearly 19.3 million registered companies (Brazil, 2022), resulting in a ratio of 0.1 inspectors per 1,000 companies (ILO, 2023). The ratio of inspectors to employees is 0.3 per 10,000 employees, whereas the ILO recommends 1 inspector per 10,000 employees (SINAIT, 2023).

Furthermore, inspections to verify compliance with occupational risk management regulations have decreased significantly. For instance, in 2019 and 2022, the number of enterprises inspected for occupational safety and health regulations dropped from 67,500 to 34,286, respectively (Brazil, 2022), a

reduction of nearly 50%. It is currently estimated that many companies will never receive a visit from an inspector. Therefore, measures to improve labor inspection services and recruit new inspectors are urgently needed. Without such measures, compliance with occupational safety and health regulations may become even less common.

The importance of labor inspection for enforcement has been emphasized by Blanc and Pereira (2020). They argue that labor inspection is not only a regulatory enforcement mechanism but also a crucial component of regulations designed to protect occupational safety and health. Our experience also shows that labor inspections significantly influence a company's compliance with occupational safety and health regulations, which aligns with findings from research conducted by Levine, Toffel, and Johnson (2012) and Niskanen (2013).

5.2 Medium and large enterprises

Table 5 presents the number of notices of violation by type of enterprise. As shown, the total number of notices of violation issued to medium and large enterprises is higher than those issued to micro and small enterprises (MSEs), with 3,644 against 1,903, representing 66% and 34% of the total notices of violation (5,547), respectively. This scenario can be explained as follows. First, we have observed as labor inspectors that some companies wait for the inspector to visit and notify them if non-compliance with regulations is identified during the workplace inspection. Only then do they start to comply with the regulations. These companies know that inspectors rarely visit them due to their small numbers, as described in subsection 6.1.

Table 5 – Number of violations by type of enterprise

Violation	Micro and small enterprise	Medium and large enterprise
The company did not develop an action plan	310	1,020
The company did not implement Occupational Risk Management (ORM)	561	429
The company did not identify all kinds of hazard that exist in the work environment	324	649
The company did not record in occupational risk inventory the identification of occupational hazards and the risk assessment process	279	594
The company did not adopt preventive measure to reduce risk level	185	320
The company, in order to determine the probability, did not consider if preventive measures have already been implemented	116	333
The company did not undertake the risk assessment arising from each occupational hazard identified in the work environment	128	299
Total	1903	3644

Source: research data

In addition, as pointed out by Hale, Borys, and Adams (2015), another contributing factor to non-compliance is the prescriptive and detailed nature of the regulations, such as RN 1. These regulations are difficult to understand due to their legalistic phrasing and complexity, making it often challenging to determine whether a particular rule applies in a given situation. Employers wait for the labor inspector to visit, then ask the inspector to specify exactly what needs to be done and how. Furthermore, non-compliance with RN 1 may be associated with the poor structure of the labor inspection and the small fines described in subsections 6.1 and 6.4, respectively. As Cardoso and Lage (2009) stated, "the effectiveness of labor regulations depends on the interaction between the overall sanctions (fines) and the probability of the employer getting caught breaking the law".

Second, in the last decade, Brazilian entrepreneurs have complained about the burden imposed by laws and regulations on companies, particularly those related to occupational safety and health, which are often detailed and prescriptive (Picolotto; Lazaretti; Trindade, 2022). According to them, such regulations and laws can reduce competition and job creation, restrict innovation and development, and increase prices for products and services, fostering an aversion to state intervention in occupational safety and health. Consequently, the number of lobbying associations representing companies and industries against these kinds of regulations has increased (Feitosa; Carvalho, 2022). As a result, proposals have been presented to repeal these regulations and reduce the regulatory burden where possible. This scenario has impacted non-compliance with occupational safety and health regulations in general, and RN 1 in particular, pushing companies even further away from regulated practices.

5.3. The challenges for micro and small enterprises

As shown in Table 5, the number of notices of violation associated with non-compliance with occupational risk management is higher in MSEs than in medium and large enterprises, with 561 against 429. This indicates that none of the steps described in Section 3.2 were carried out by 561 MSEs. This number may be higher because, according to Brazilian labor legislation, MSEs only have to be notified of violations when they are visited twice by a labor inspector. Therefore, some MSEs may not have been visited twice by a labor inspector yet.

Micro and small enterprises (MSEs) account for nearly 99% of companies in Brazil, numbering about 18.5 million and providing 62% of existing jobs. They are also responsible for 30% of the Gross National Product (GNP) (SEBRAE, 202?). Therefore, they form the backbone of the Brazilian economy and are a key driver for economic growth and employment. However, these companies generally are in a weak economic position, suffer from a lack of resources, and are primarily concerned with economic survival, especially during economic crises, leading many to pursue 'low road' business strategies. Consequently, MSEs have attitudes and priorities that do not favor occupational safety and health and do not tend to invest in this area. Additionally, there is limited knowledge, awareness, and competence on the part of owner-managers regarding this subject. As a result, MSEs have great difficulty in complying with occupational safety and health regulations. Previous studies conducted in other countries have found similar contexts (Jensen; Alstrup; Thoft, 2001; Rodrigues *et al.*, 2020; Salguero-Caparrós *et al.*, 2020). Consequently, the health and safety of most workers employed in MSEs is poorly protected.

The influence of occupational risk management regulation on MSEs reveals a complex reality, making the role of governance and regulation in improving the work environment in micro and small enterprises not straightforward. Furthermore, previous studies have suggested that these firms possess an antipathy to state intervention in occupational safety and health in the form of regulation and regulatory inspection (Nichols, 1997; Wright, 1998). An aggravating factor is the sheer number of MSEs in Brazil and their diversity, which present significant challenges for both regulation and the regulatory body responsible for monitoring and promoting compliance with regulatory norms.

It is widely held that additional strategies are necessary, besides occupational risk management regulation in Brazil. For example, it is essential to have public policies and interventions for effective occupational safety and health management in MSEs to guarantee the well-being of workers and ensure the long-term economic survival of these enterprises. To achieve this, the following points are important: 1) involvement of all key regulatory actors; reinforcement of regulatory inspections; 2) availability of sustainable, easily applicable, and transferable solutions; 3) better inclusion of occupational safety and health into sector-specific education systems; 4) involvement of worker and employer representatives in the proposal of public policies and interventions to reach MSEs; 5) better supply chain arrangements.

Additionally, public policies and interventions in MSEs should be part of continuous action in a complex scenario. They should be understood as part of wider societal and economic developments that both impact and are influenced by national and sectoral policies and the enforcement of regulations (Hale; Borys; Adams, 2015). As can be seen, MSEs constitute a special challenge for the development of public policies and interventions aimed at improving workplace safety and health in Brazil.

5.4. The value of the fines

Table 6 shows the minimum and maximum value of the fines associated with non-compliance with RN 1 in Brazilian and European currency, reais and euros, respectively. The value of a fine ranges from 1,201 reais (229 euros) to 5,245 reais (999 euros). The exchange rate used was one euro equivalent to 5.25 Brazilian Reais in July/2023. The value of the fines applied depends on the number of employees and whether the company is a repeat offender.

Table 6 – Minimum and maximum value of fine associated with violation with RN 1

Violation	Value of fine (real/euro)	
	Minimum	Maximum
The Company did not develop an action plan	1,799 (343)	5.245 (999)
The company did not implement Occupational Risk Management (ORM)	1,799 (343)	5.245 (999)
The company did not identify all kinds of hazards that exist in the work environment	1,799 (343)	5.245 (999)
The company did not record in occupational risk inventory the identification of occupational hazards and the risk assessment process	1,201 (229)	3.435 (624)
The company did not adopt preventive measure to reduce risk level	1,799 (343)	5.245 (999)
The company, in order to determine the probability, did not consider if preventive measures have already been implemented	1,799 (343)	5.245 (999)
The company did not undertake the risk assessment arising from each occupational hazard identified in the work environment	1,799 (343)	5.245 (999)
Total	11,995 (2,287)	34,905 (6,618)

Note: The exchange rate used was one euro is equivalent to 5.25 real em July/2023
Source: research data

The value of the fines for non-compliance with occupational safety and health regulations in Brazil often leads companies not to comply with them, as the cost of paying the fine is usually lower than the cost of adopting preventive measures to improve the work environment, as demonstrated by Cardoso and Lage (2009). Therefore, there is a need for a significant increase in the size of the fines imposed for non-compliance with occupational safety and health regulations. Ncube and Kanda (2018) have suggested that costly and deterrent fines should deter present and future perpetrators of unsafe and undesirable occupational safety and health practices.

6 Conclusion, limitation and future works

It was investigated whether the strategy adopted by the Brazilian Federal Government to encourage improvements in the safety and health of workers and to reduce the high number of occupational accidents and illnesses is being implemented by companies. The aim was to inform both science and society. We consider the adopted strategy, occupational risk management regulation, necessary due to the wide diversity of enterprises in the country, which have different technological levels, sizes, motivations, resources, and competencies, with most being MSEs. Risk control solutions based solely on risk management process rules, without obligations, are ineffective. As mentioned earlier, market forces alone are insufficient in motivating companies to reduce occupational risks; thus, government regulations are essential to protect employees from excessive workplace risks.

However, the occupational risk management regulation strategy alone is not enough. The high number of notices of violation associated with non-compliance with RN 1 during the studied period indicates that many companies have not implemented occupational risk management. Here, it is a set of measures that should accompany this strategy to ensure its success. Firstly, measures to improve labor inspection services (e.g., human, material, and financial resources) are crucial and urgently needed to

support regulation enforcement. Safety and health regulatory bodies should be strengthened to consistently and thoroughly carry out workplace inspections and ensure compliance with regulations.

Secondly, it is imperative to increase fines associated with non-compliance with occupational safety and health regulations to prevent any disregard for safety and health at work and consequently protect workers. Thirdly, another essential measure is to frame public policy and interventions that encourage MSEs to comply with occupational risk management and invest in workplace improvements. These measures could be tailored to specific MSE groups, addressing their unique needs, and should be complemented by other economic and social measures implemented by the federal government. Without these measures, the occupational risk management regulation strategy will fail.

A limitation of this study is that only considers the factors influencing how regulations work in Brazil. Other factors include the political context, national culture, legislative traditions, and structures. The discussion has been limited to Brazil and its occupational risk management regulations. Furthermore, there is a need for further research into the role and influence of regulation and regulatory inspection, as well as other means of influencing occupational risk management in companies, particularly in MSEs, in the context of the structural and cultural features of the economy. Another limitation is that the perception of employers, labor inspectors, and safety professionals about the challenges of implementing risk management in Brazil was not explored. The precise nature of these influences should be explored further through qualitative and quantitative studies.

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Declaration of interest
The authors declare no conflict interest.

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