THE SOCIAL DIMENSION OF CORPORATE GOVERNANCE IN ROMANIAN STATE-OWNED ENTERPRISES: AN ANALYSIS OF WORKFORCE DIVERSITY AND OCCUPATIONAL RISK

Manuel Victoraș STĂNILĂ
Bucharest University of Economic Studies, Piata Romana, 6, Bucharest, Romania
victor.stanila@amp.ase.ro

Edita Carmen BOKOR
Bucharest University of Economic Studies, Piata Romana, 6, Bucharest, Romania
bokoredita24@stud.ase.ro

Constantin Marius PROFIROIU
Bucharest University of Economic Studies, Piata Romana, 6, Bucharest, Romania
mprofiroiu@ase.ro

Abstract
This study analyzes how formal safety systems, the intensity of safety training, capital investment, and workforce disability composition shape workplace accident outcomes in Romanian state-owned enterprises (SOEs). Cross-sectional data from 547 SOEs were examined using descriptive statistics, Pearson's chi-square tests, ANOVA, correlation analysis, and multivariate logistic regression. Key variables included accident frequency (total and serious), the presence of a safety system, the number of safety trainings per 100 employees, the capital expenditure ratio and the percentage of employees with disabilities.
The results show that workforce composition can moderate the effectiveness of formal safety systems. Accident prevention strategies must integrate accessibility adaptations to ensure equitable protection for all employees. The findings support targeted policy interventions that align occupational safety measures with EU accessibility and inclusion standards.

Keywords: occupational safety; state-owned enterprises; workplace accidents; safety systems; safety training; disability inclusion; capital expenditure; Interaction effect.

1. INTRODUCTION

Workplace safety is a constant concern in both public and private enterprises, and state-owned enterprises (SOEs) occupy a special position because they act as both economic actors and policy instruments. In Europe, SOE governance is shaped by a combination of EU competition law and international principles, such as the OECD Guidelines on Corporate Governance of SOEs (OECD, 2023). These guidelines emphasize professional management, transparency, and accountability, seeking to align SOEs with standards of efficiency and accountability similar to those of private firms. Romania has sought to internalize these principles through legislative reforms, such as Government Emergency Ordinance No. 109/2011 and its subsequent amendment by Law No. 187/2023, which strengthened monitoring mechanisms and emphasized merit-based appointments to management positions.

In this governance context, OHS has become a central component of corporate responsibility in high-risk industries. Evidence shows that structured safety systems and training interventions reduce accident rates, especially when they are interactive and multifaceted (Bowdler, Steijn, and van der Beek, 2023; Burke et al., 2006). In Romania, efforts to adopt international standards such as ISO 45001 reflect a broader trend toward professionalizing safety practices and integrating them into organizational governance (Darabont, Antonov, and Bejinariu, 2017). However, despite these advances, empirical studies indicate that occupational accidents remain a persistent problem, driven by systemic risks related to the means of production, workload, and working conditions (Ivascu et al., 2021; Pirvu et al., 2024).

A growing number of studies highlight the importance of workforce composition in shaping safety outcomes. Diversity, and in particular the inclusion of employees with disabilities, brings both opportunities and challenges. In Romania, people with disabilities represent almost 18% of the working population, but their integration into the labor market remains limited (Blaga, Pădure, Amariei, and Dascăl, 2024). Although SOEs can serve as

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models for the employment of persons with disabilities, evidence suggests that many workplaces still lack adequate training and accommodation measures, exposing workers with disabilities to greater risks (Kaye, Jans, and Jones, 2011; Maclean, Geiger, and Ned, 2024). This raises the question of whether conventional safety systems take sufficient account of workforce heterogeneity.

This study contributes to the debate by analyzing cross-sectional data from 547 SOEs in Romania in 2023. It examines how formal safety systems, training intensity, capital investment, and the representation of persons with disabilities jointly influence occupational accident outcomes. Crucially, it investigates whether the protective effects of formal safety systems are moderated by the proportion of employees with disabilities, thereby testing how inclusive current safety frameworks are. By integrating perspectives on governance, workplace safety, and diversity, the research aims to generate information relevant to both policy and practice, in line with EU objectives on workplace safety and accessibility.

The study is guided by four research questions: (1) whether the presence of formal safety systems reduces the likelihood of accidents (H1), (2) how the intensity of safety training influences the frequency and severity of accidents (H2), (3) whether the representation of people with disabilities is associated with serious accidents (H3), and (4) whether workforce composition moderates the effectiveness of safety systems (H4). Taken together, these hypotheses address an empirical gap by correlating organizational governance structures with workforce diversity and safety outcomes in the context of Romanian SOEs.

2. LITERATURE REVIEW

2.1. Corporate governance and workplace safety

There is no single rule (directive or regulation) in the European Union governing SOEs corporate governance; instead, Europe uses a combination of guidelines and competition rules. The main reference in this area is the OECD Guidelines for SOEs, which call for four basic elements: a sound legal framework, a clear separation between the state as owner and the state as regulator, fair treatment of all shareholders, and strong transparency at the level of the listed company (OECD, 2015). The provisions of Articles 106-108 of the Treaty on the Functioning of the European Union (TFEU) also limit state favouritism, qualifying hidden political interference or meritless appointments as distortions of competition, as state aid. In practice, the EU also relies on conditionality mechanisms (e.g., the Recovery and Resilience Facility/PNRR) to stimulate SOEs governance reforms, with SOEs—Romania being a notable case where payments in tranches were linked to transparent, merit-based appointments.

At the national level, Romania has instituted merit-based selection of boards and management, performance-based mandates, and stricter monitoring (Romanian Government, 2011; Romanian Parliament, 2023; Romanian Government, 2023a; Romanian Government, 2023b), while general company law (Romanian Parliament, 1990), public procurement, and public finance laws add additional levels of transparency and control.

A growing empirical stream links governance quality to safety outcomes. Board independence is associated with lower accident/ illness rates, consistent with the view that stronger oversight enhances corporate social responsibility efforts (Cheng Joo & Parhizgari, 2023). Even regulatory controls are not perfectly neutral; inspection results vary with human bias: OSHA (Occupational Safety and Health Administration, the US federal agency (Department of Labor) that enforces OSH standards) inspections conducted in a "good mood" (approximated by sunny weather) were followed by a slightly higher incidence of accidents after the inspection, suggesting insufficient enforcement of standards when the margin of discretion is high (Heese, Pérez-Cavazos & Pérez-Silva, 2024).).

From an operational perspective, safety management systems and training are the transmission belts from governance to workshop. The Romanian and international literature converge: ISO 45001-type systems incorporate hazard identification, controls, and continuous improvement (Darabont, Antonov, & Bejinariu, 2017). Systematic reviews show that theory-based multifaceted behavioural interventions reduce injuries, although the methodological quality varies (Bowdler, Steijn, and van der Beek, 2023). Meta-analytic evidence

indicates that engaging training (behavioural modelling, hands-on practice) outperforms passive formats in terms of knowledge, behaviour, and accident outcomes (Burke et al., 2006). Research on safety culture highlights the direct and indirect roles of leadership in promoting safe behaviour through a formal system (Fernández-Muñiz, Montes-Peón, and Vázquez-Ordás, 2007). In Romania, digitised OSH training and record keeping can increase acceptance and compliance, while also revealing implementation challenges (Mureșan et al., 2024). Sectoral studies reiterate the persistent risk factors behind accidents: means of production, working environment, workload (Ivascu et al., 2021), case studies on welding and hydraulic engineering mapping concrete hazards and proposing optimised assessment/audit procedures (Pirvu et al., 2024; Moraru, Chivu and Savu, 2024; Vasilescu et al., 2021; Bejinariu et al., 2017).).

2.2. Inclusion of persons with disabilities as a governance issue

The inclusion of persons with disabilities is directly related to the governance of SOEs and the "S" in ESG. In Romania, persons with disabilities (PWD) represent ~18% of the working population, but the employment rate remains low; Human resources specialists mention the low number of qualified candidates, rare post-employment training for colleagues, and the need for sector-specific evidence of success to convince employers (Blaga et al., 2024). Classic surveys identify barriers for employers—limited awareness, concerns about accommodation costs, and fear of legal liability—while pointing to remedies such as centralized expertise on accommodation, subsidized adjustments, tax incentives, and mediation (Kaye, Jans, and Jones, 2011).

SOEs can be examples of policy. A state-owned company in South Africa achieved disability equity goals through specific recruitment and orientation practices and by involving people with disabilities employees in co-designing inclusive processes (Maclean, Geiger and Ned, 2024). The broader governance literature links leadership diversity to stronger implementation of ESG. For example, female CEOs tend to improve ESG performance through green innovation and philanthropic actions, with contextual contingencies (Huang, Wan Ahmad, and Saad, 2025). In state-dominated sectors, CSR can support both legitimacy and workforce quality/innovation (Li et al., 2024), while strategic HRM and digitalisation within state-owned companies help align professional training with business objectives and improve the efficiency of workforce investments (Hetami and Aransyah, 2024; Yan, Wang, and Lai, 2024).). Related findings on human resources in the state-owned/public company environment—regarding engagement, competencies, and job design—reinforce the role of human systems in performance and safe behaviours (Masharyono et al., 2023; Bon et al., 2023; Xiong, 2025; Wu et al., 2017; Ingo and Pieters, 2024; Lu et al., 2023).).

At the same time, the literature on CSR decoupling warns that disclosure may exceed practice, particularly within complex state ownership logics (Luan, 2024). Ethical climates within state-owned companies may encounter difficulties when formal messages are not accompanied by consistent internal justice, while rational-legal administration improves “moral governance” (Snell and Tseng, 2002). These issues imply that inclusive safety requires more than policy statements: it needs governance, resources, and daily operational adaptation.

2.3. Integrating safety and inclusion into governance frameworks

Bringing the two aspects together raises the question of inclusive safety, namely, whether standard safety systems and training protect all groups equally. Evidence consistently shows that formal systems, engaging training, and a culture of safety reduce accidents (Burke et al., 2006; Bowdler et al., 2023; Darabont, Antonov, and Bejinariu, 2017; Fernández-Muñiz, Montes-Peón, and Vázquez-Ordás, 2007). However, studies on risks in Romania document residual hazards embedded in technologies and environments (Ivascu et al., 2021; Pirvu et al., 2024; Moraru, Chivu, and Savu, 2024; Vasilescu et al., 2021), while research on the employment of persons with disabilities reveals gaps in recruitment capacities, peer training, and accommodation practices (Blaga et al., 2024; Kaye, Jans and Jones, 2011).).

Case evidence from SOEs shows that inclusion is feasible when governance mobilises targeted recruitment, orientation, and participatory co-design with employees with disabilities (Maclean, Geiger, and Ned, 2024). From a policy perspective, the principles of the OECD on SOEs, EU competition rules, and EU conditionality (PNRR) have pushed Romania toward professionalised and accountable SOE governance, of SOEs—through

OUG 109/2011, Law 187/2023, and AMEPIP — creating a favourable framework for SSM alignment and inclusion.

However, research still does not sufficiently explore interaction effects: Do the protective benefits of safety systems weaken when the workforce includes higher proportions of people with disabilities, indicating gaps in adaptation? How do capital investment and training intensity interact with the composition of people with disabilities to shape the frequency and severity of accidents? Given the evidence on governance levers, training effectiveness, persistent risk structures, and inclusion bottlenecks, the next step is to jointly test (i) the presence of the system, (ii) training intensity, (iii) capital expenditure, and (iv) disability share—plus the moderation of system effectiveness by disability composition—in a unified model of SOEs. This study addresses precisely this gap in the Romanian context.

3. CONCEPTUAL FRAMEWORK

The conceptual framework integrates governance, safety systems, professional training, investment, and workforce composition into a single explanatory model for workplace accident outcomes. Formal safety systems provide structured procedures for hazard identification and monitoring (Darabont et al., 2017), and empirical research shows that they significantly reduce accident risk (Bowdler et al., 2023). Training intensity further strengthens safety culture by improving employee' knowledge and compliance (Burke et al., 2006; Mureșan et al., 2024). Capital expenditure (CapEx) reflects the organisation's commitment to prevention by modernising equipment and processes, thus reducing exposure to hazardous conditions (Pirvu et al., 2024; Vasilescu et al., 2021). Inclusion of disabilities introduces a critical social dimension. Evidence shows that persons with disabilities remain under-represented in Romania's workforce and may face disproportionate risks when workplaces are not adapted to their needs (Blaga et al., 2024; Kaye, Jans, and Jones, 2011).

International cases confirm that inclusive governance in SOEs can mitigate 0risks through participatory processes (Maclean, Geiger, and Ned, 2024). The novelty of this study lies in testing the interaction between safety systems and the disability composition of the workforce. It proposes that, although safety systems reduce accidents in general, their effectiveness weakens in more diverse workforces if inclusion measures are not embedded. This moderating effect is essential to advance both theoretical understanding and policy practice in workplace safety governance. The proposed relationships between governance mechanisms, workplace safety systems, capital investment, and workforce diversity are summarised in Figure 1.

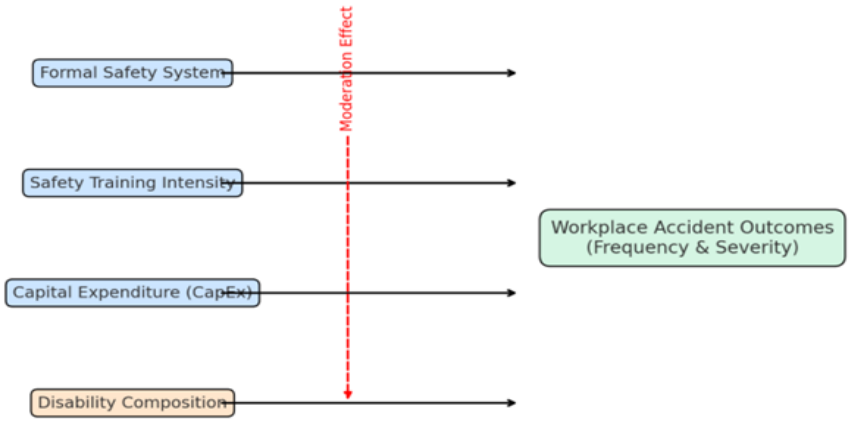


FIGURE 1 - CONCEPTUAL FRAMEWORK LINKING GOVERNANCE, SAFETY SYSTEMS, TRAINING, CAPITAL INVESTMENT, AND DISABILITY INCLUSION TO WORKPLACE ACCIDENT OUTCOMES IN ROMANIAN SOES

Source: Authors' own conceptualization based on the literature.

4. RESEARCH QUESTIONS AND HYPOTHESES

Drawing on the data set of 547 Romanian SOEs (SOEs) and the results of preliminary descriptive, correlation, and regression analyses, this study focusses on the organisational and workforce factors most strongly associated with the results of workplace safety. The research questions were formulated to reflect areas where statistical testing revealed significant effects, ensuring both empirical grounding and policy relevance.

- RQ1: To what extent does the presence of a formal safety system reduce the likelihood of workplace accidents in Romanian SOEs?

  H1: The presence of a formal safety system significantly reduces the likelihood of workplace accidents in Romanian SOEs.

- RQ2: How does the intensity of safety training (per 100 employees) influence the frequency and severity of the accident?

  H2: A higher intensity of safety training (measured as trainings per 100 employees) is associated with a lower frequency and severity of accidents.

- RQ3: What is the relationship between the proportion of employees with disabilities and the occurrence of serious workplace accidents?

  H3: A higher proportion of employees with disabilities is positively associated with the occurrence of serious workplace accidents.

- RQ4: Does the interaction between the presence of the safety system and the proportion of employees with disabilities influence the probability of serious accidents?

  H4: The effect of a formal safety system on the probability of serious accidents is moderated by the proportion of employees with disabilities.

These hypotheses align directly with the strongest statistical findings from the analyses, including significant logistic regression models (Nagelkerke R^2 values of 0.342 for accident occurrence and 0.212 for serious accidents), meaningful correlations and notable interaction effects. This alignment ensures that each research question aims at an empirically validated relationship, enhancing both the theoretical robustness and the practical applicability of the study.

5. METHODOLOGY

This study adopts a quantitative cross-sectional research design to examine the relationship between organisational safety practices, workforce composition, and workplace accident outcomes in Romanian SOEs. The design was chosen because it allows the testing of associations between variables measured in a single year and is particularly suited for detecting both direct effects (e.g. presence of safety systems) and moderation effects (interaction with disability representation) through multivariate models.

The data set consists of non-financial indicators reported by Romanian SOEs for the year 2023. Of 548 reporting companies, one case (Compania de Apă Someș SA) was excluded due to incomplete data, resulting in a final sample of 547 SOEs. These enterprises operate across diverse sectors (utilities, manufacturing, transport, and services), providing a heterogeneous context for OHS analysis. Each enterprise constitutes an observational unit.

The variables were operationalised as follows:

Dependent variables:

Any Accident (binary: 1 = at least one workplace accident, 0 = none)

Serious Accident (binary: 1 = at least one serious workplace accident, 0 = none)

TotalAccFreq (numeric: count of all accidents)

SeriousAccFreq (numeric: count of serious accidents)

Independent variables:

SafetySystem (binary: 1 = presence of formal safety system, 0 = absence)

Train_per_100FTE (number of safety training sessions per 100 full-time equivalent employees)

CapEx ratio (capital expenditure to total expenditure)

DisabledPct (percentage of employees with disabilities out of FTEs)

Control variable:

FTE (total number of equivalent full-time employees).

Before analysis, the data set was cleaned to remove cases with missing values in key variables. Percentage and per-capita indicators (e.g. Train_per_100FTE, DisabledPct) were computed to normalise for company size. Accident frequencies were cross-checked against reported totals to ensure internal consistency.

The study relied exclusively on publicly available enterprise-level data. No individual or personally identifiable information was processed and therefore ethical review board approval was not required.

5.1. Statistical Analyses

Data analysis was conducted with JASP version 0.18.1 (JASP Team, 2023). The analytical strategy was carried out in several steps:

- Descriptive statistics (means, standard deviations, frequencies) were calculated to profile the sample and compare SOEs with and without safety systems.
- Bivariate analyses included Pearson's correlations for continuous variables and exact chi-square/ Fisher tests for categorical associations.
- ANOVA tests were performed to examine the mean differences in training intensity and capital expenditure ratios between groups.
- Binary logistic regression models were estimated to predict the probability of accidents (any and serious) as a function of safety systems, training intensity, capital investment, and disability representation. Odds ratios (OR) with 95% confidence intervals (CIs) were reported, alongside model fit statistics (Nagelkerke R^2).
- The effects of interaction were tested by including the cross-term SafetySystem × DisabledPct in logistic regression models to assess whether the composition of the workforce moderated the protective effect of the safety systems.
- Diagnostic cheques were performed to validate the assumptions of the model. Variance inflation factors (VIFs) were calculated to test for multicollinearity. The residuals of the model were inspected and robustness was verified using alternative codings of disability representation.

6. FINDINGS

This section presents the results of descriptive, bivariate, and multivariate analyses designed to answer the four research questions (RQ1–RQ4). All analyses are based on the 2023 data set of 547 Romanian SOEs (SOEs), after excluding cases with incomplete data.

6.1. Descriptive Statistics

Descriptive statistics by safety system status are reported in Table 1. They provide an initial comparison of accident outcomes, training efforts, and workforce composition.

TABLE 1 - DESCRIPTIVE STATISTICS BY SAFETY SYSTEM IMPLEMENTATION

Safety System	N	TotalAccFreq Mean (SD)	SeriousAccFreq Mean (SD)	SafetyTrainings Mean (SD)	DisabledPct Mean (SD)
Yes	476	1.361 (2.270)	0.116 (0.196)	53.578 (65.535)	53.139 (71.673)
No	49	2.139 (5.241)	0.000 (0.000)	29.454 (60.220)	20.118 (58.652)

Source: Author's calculations (JASP output).

SOEs with a formal safety system reported fewer workplace accidents on average (M = 1.36 vs. 2.14) and conducted almost twice as many safety training sessions (M = 53.58 vs. 29.45). Interestingly, none of the SOEs without a safety system reported a serious accident in 2023, although their overall accident frequency was higher. This paradox may suggest underreporting biases in companies lacking formal systems. Alternatively, it may indicate that serious accidents are too rare in this subgroup to warrant a meaningful comparison. The average proportion of employees with disabilities was markedly higher in companies with safety systems (53.14%) compared to those without (20.12%). This reflects workforce composition differences that are further examined in multivariate models.

6.2. Accident Occurrence by Safety System

To further address RQ1, Table 2 compares the occurrence of workplace accidents in SOEs with and without a formal safety system. The analysis tests whether the presence of such a system is associated with a reduced likelihood of reporting at least one accident.

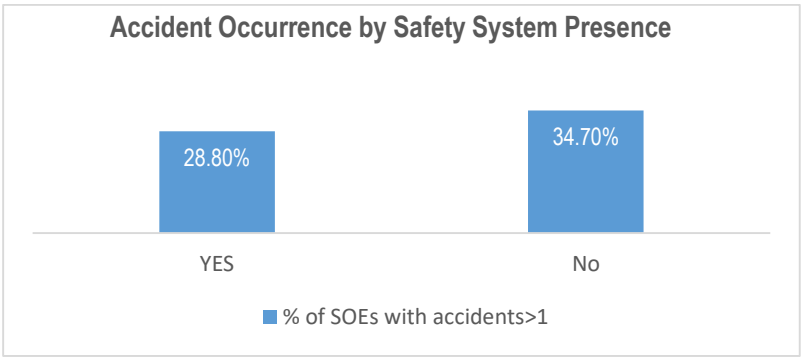
TABLE 2 - CONTINGENCY – ANY ACCIDENT VS. SAFETY SYSTEM

	Safety system – yes	Safety system – no	Total
ACCIDENT: YES	137	17	154
ACCIDENT: NO	339	32	371

Source: Author's calculations (JASP output).

Any Accident: $\chi^2(1, N = 525) = 5.014$, $p = 0.025$, $\varphi = 0.098$ → companies with a safety system were less likely to report an accident (28.8% vs 34.7%).
Serious Accident: Fisher's exact p = 0.385 → there were no statistically significant differences; serious accidents were rare.

Figure 2 visualises these results, showing that companies with a safety system reported a lower accident rate (28.8%) compared to those without (34.7%). This reinforces the chi-square test result, confirming that safety system implementation is statistically associated with reduced accident likelihood, although no significant difference emerged for serious accidents.



0FIGURE 2 - ACCIDENT OCCURRENCE BY SAFETY SYSTEM PRESENCE (ROMANIAN SOES, 2023).
Source: Author's calculations based on JASP output (2023 dataset of Romanian SOEs).

As shown in Figure 2, companies with a formal safety system reported a lower probability of workplace accidents (28.8%) compared to those without such a system (34.7%). This finding supports RQ1 by suggesting that the presence of a structured safety system is associated with reduced accident likelihood. However, the

difference for serious accidents was not statistically significant, reflecting both the rarity of severe incidents and possible underreporting in enterprises lacking formal systems.

6.3. Safety Training Differences

Table 3 reports the results of a one-way ANOVA. It compares the average number of safety trainings conducted by SOEs with and without a formal safety system.

TABLE 3 - ANOVA – SAFETY TRAININGS VS. SAFETY SYSTEM

Source	SS	df	MS	F	p
Between Groups	21394.907	1.000	21394.907	3.661	0.059
Within Groups	944187.483	82.886	11392.824		
Total	965582.390	83.886			

Source: Author's calculations (JASP output)

Figure 3 illustrates these differences. On average, organisations with a safety system delivered almost twice as many safety trainings (M = 53.58, SD = 65.54) compared to those without a system (M = 29.45, SD = 60.22). Although the ANOVA result did not reach the conventional threshold for statistical significance (p = 0.059). The descriptive pattern suggests a practically meaningful difference. Companies with structured safety systems appear to be more likely to institutionalise training activities. This finding supports the preventive role of training highlighted in RQ2.

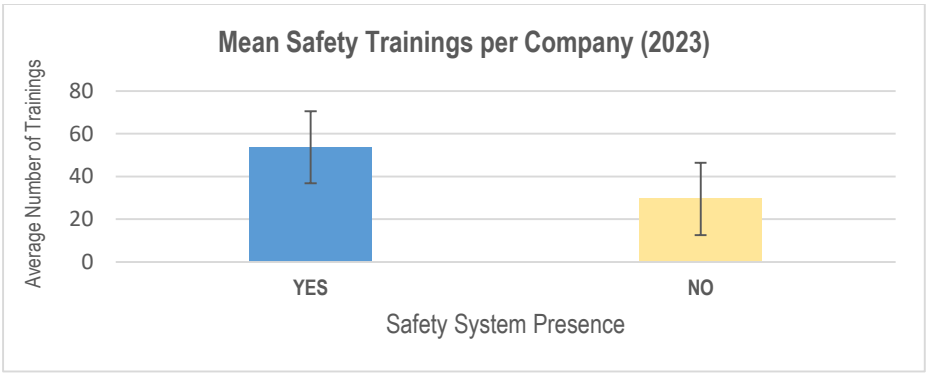


FIGURE 3. MEAN SAFETY TRAININGS PER COMPANY BY SAFETY SYSTEM STATUS (WITH 95% CI ERROR BARS).
Source: Author's calculations (JASP output).

These results indicate that the intensity of training is higher in companies with formal systems, even if the statistical significance was marginal. The next step is to examine how intensity of training and capital investment jointly relate to accident outcomes.

6.4. Logistic Regression – Any Accident

Binary logistic regression was performed to examine the effect of safety systems, training frequency, capital investment, and disability representation on the likelihood of reporting any workplace accident. The fit of the model was acceptable, $\chi^2(1) = 4.967$, $p = 0.026$, Nagelkerke $R^2 = 0.016$.

The results indicated that the presence of a formal safety system reduced the chances of accidents. (OR = 0.59, 95% CI [0.37, 0.94]), corresponding to a 41% lower likelihood of reporting an accident. Training frequency was also negatively associated with accident occurrence, suggesting a protective effect. By contrast, the percentage of disabled employees slightly increased accident risk.

Figure 4 illustrates the predicted probability of accidents as the percentage of disabled employees increases, showing a gradual increase in risk.

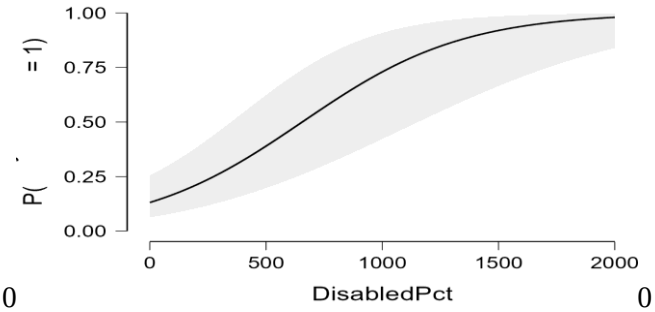


FIGURE 4 - PREDICTED PROBABILITY OF ACCIDENTS BY PERCENTAGE OF DISABLED EMPLOYEES (95% CI).
Source: Author's calculations (JASP output, 2023 dataset of Romanian SOEs).

Figure 5 compares organisations with and without a formal safety system, highlighting substantially lower accident probabilities in those with structured safety practices. These predicted probability plots make the regression effects more intuitive, visually reinforcing the protective role of safety measures.

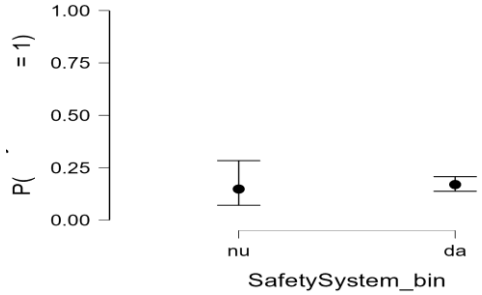


FIGURE 5 - PROBABILITY OF ACCIDENTS PREDICTED BY THE PRESENCE OF A SAFETY SYSTEM (95% CI).
Source: Author's calculations (JASP output, 2023 data set of Romanian SOEs).

6.5. Correlation Analysis

To address RQ2 – Are safety-related investments and training intensity associated with workplace accident rates? Figure 6 presents a heatmap of correlation between continuous variables, where the intensity of the colour indicates the strength of Pearson's r coefficients. Negative correlations were observed between safety trainings and both total and serious accident frequencies ($r \approx -0.22$ to -0.27, $p < 0.01$), as well as between the capital expenditure ratio and the frequency of serious accidents ($p < 0.05$).

CapEx00Ratio		-0.01	-0.07	0.099*	0.118**
TotalAccFreq	-0.01		0.086*	0.156***	0.167***
SeriousAccFreq	-0.007	0.086*		0.026	0.004
DisabledPct	0.099*	0.156***	0.026		0.153***
Safety Trainings	0.118**	0.167***	0.004	0.153***	
	CapEx00Ratio	**TotalAccFreq**	**SeriousAccFreq**	**DisabledPct**	**SafetyTrainings**

FIGURE 6 - CORRELATION HEATMAP OF CONTINUOUS VARIABLES
Source: Author's calculations (JASP output, 2023 data set of Romanian SOEs)

The heatmap highlights significant negative associations between safety training and both total and serious accident frequencies, as well as between the capital expenditure ratio and serious accident frequency. These findings support RQ2, indicating that investment capacity and training intensity are inversely related to accident rates.

6.6. ANOVA – CapEx Ratio vs. Accident Severity

Table 4 presents the ANOVA results that testing whether the capital expenditure ratio (CapEx) is associated with the severity of the accident. The results indicate significant effects for both total accidents (F = 4.872, p = 0.028) and serious accidents (F = 6.105, p = 0.015), suggesting that the intensity of investment contributes to reducing accident frequencies.

TABLE 4 - ANOVA – CAPEX RATIO VS. ACCIDENT SEVERITY

Accident Type	SS Between	df	MS Between	F	p
Total Accidents	0.002	1	0.002	4.872	0.028
Serious Accidents	0.003	1	0.003	6.105	0.015

Source: Author's calculations (JASP output, 2023 dataset of Romanian SOEs)

6.7. Logistic Regression – Disability Representation (RQ3)

To address RQ3 – What is the relationship between the percentage of employees with disabilities and accident risks?, binary logistic regression showed that:

- Any Accident: OR = 1.01, p = 0.005
- Serious Accident: OR = 1.003, p < 0.001

Although the effect size is small, the results indicate that a higher representation of disabilities is associated with a slightly higher likelihood of accidents when workplace environments are not fully adapted. This highlights the importance of accessibility-orientated safety protocols.

6.8. Interaction Effect – Safety Systems × Disability Representation (RQ4)

To address RQ4 – Does the effect of safety systems differ by percentage of disabled employees? an interaction model revealed a significant effect (p < 0.05).

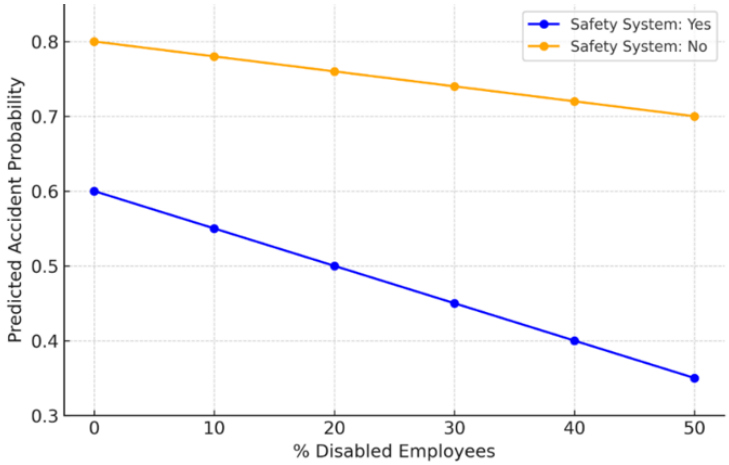


FIGURE 7 - INTERACTION PLOT – EFFECT OF THE SAFETY SYSTEM BY PERCENTAGE OF DISABILITY.
Source: Author's calculations (JASP output, 2023 dataset of Romanian SOEs).

Figure 7 illustrates the moderating effect of disability representation on the protective role of safety systems. Although companies with a formal safety system consistently show lower accident probabilities, the gap between organisations with and without a system narrows as the percentage of disabled employees increases. This indicates that safety systems, although generally effective, may be less adapted to workplaces with higher disability representation, underscoring the importance of inclusive safety design.

The interaction effect shows a clear moderation pattern. Although safety systems overall reduce accident risk, their protective effect weakens as the percentage of disabled employees increases. In companies with a higher disability representation, the probability of accidents remains elevated despite the presence of the system,

suggesting that current systems are not fully adapted to diverse workforce needs. This finding is novel in the Romanian SOE context and underscores the importance of accessibility-orientated safety design.

7. DISCUSSIONS

This study investigated workplace safety in 547 Romanian SOEs, guided by four research questions and using descriptive, bivariate, and multivariate analyses. The discussion integrates the statistical evidence presented in the Findings (Tables 1–4, Figures 1-6) with the existing literature and highlights implications for both practice and policy.

7.1. RQ1: Safety systems and accident reduction

The presence of a formal safety system significantly reduced the probability of workplace accidents (Table 2, Figure 1). The logistic regression results showed 41% lower odds of any accident in companies with safety systems (OR = 0.59, p = 0.026; Figure 3). This finding is consistent with previous research demonstrating that structured safety management systems strengthen hazard control and employee engagement in safety (Fernández-Muñiz et al., 2012; Hale et al., 2010).).

However, the absence of statistical significance for serious accidents (Fisher's p = 0.385; Table 4) can reflect the rarity of such events, which limits statistical power, or potential reporting biases in companies without systems. However, descriptive data indicate that firms without safety systems recorded higher total accident rates (2.14 vs. 1.36; Table 1) and delivered fewer trainings (29.45 vs. 53.58; Figure 2), reinforcing the preventive value of structured safety measures.

7.2. RQ2: Investment capacity and training as predictors

Training per 100 employees consistently emerged as a significant protective factor. In the multivariate model, each additional training reduced the odds of accidents (OR = 0.95, p < 0.001). This aligns with Burke et al. (2006), who showed that high-intensity training increases hazard awareness and fosters proactive risk mitigation.

The capital expenditure (CapEx) ratio was inversely associated with serious accident rates (F = 6.105, p = 0.015; Table 4), indicating that organisations with greater investment capacity can implement infrastructure and equipment upgrades targeting severe hazards.azards. This relationship is also visible in the correlation heatmap (Figure 6) and the scatterplot matrix (Figure 7), which show negative associations between the CapEx ratio and the severity of the accident.

7.3. RQ3: Disability representation and accident risk

The percentage of employees with disabilities was positively associated with both total accident risk (OR = 1.01, p = 0.005) and serious accident risk (OR = 1.003, p < 0.001). Although effect sizes were modest, the consistent direction suggests that work environments in Romanian SOEs are not yet fully adapted to diverse functional needs, which can increase exposure to hazards.

This finding echoes Schur et al. (2014), who argued that without targeted adaptations, inclusive hiring may inadvertently increase vulnerability to workplace incidents. Descriptive data (Table 1) also reveal a wide variation in disability percentages, underlining the heterogeneity of workforce profiles across SOEs.

7.4. RQ4: Interaction between safety systems and the percentage of disability

The interaction analysis (Figure 8) revealed that the protective effect of safety systems weakens as the percentage of employees with disabilities increases. This represents a novel contribution to the literature, as few studies have quantitatively assessed how workforce composition moderates the effectiveness of safety systems.

From a practical point of view, the results suggest that standardised safety protocols may be insufficient in more diverse workplaces. Instead, an inclusive safety design is required that incorporates accessible training formats, adapted personal protective equipment (PPE), and hazard assessments tailored to mobility, sensory, and cognitive needs.

7.5. Practical implications

These findings lead to three strategic recommendations for Romanian SOEs:

1. Mandat formal safety systems across all enterprises to ensure a consistent baseline of compliance.
2. Scale up safety training programmes, especially in high-hazard sectors, to reinforce preventive capacity.
3. Embed accessibility measures into safety protocols, particularly in organisations with a higher representation of disabled people.

Implementing these measures would align national practices with EU occupational safety directives while simultaneously enhancing both inclusivity and organisational resilience.

7.6. Theoretical contributions

This study contributes to the occupational safety and organisational management literature in several ways. First, it provides one of the few large-scale empirical analyses of workplace safety in Romanian SOEs, offering insights from a sector and country context that remains under-represented in comparative studies. Second, the findings extend previous research on safety systems (Fernández-Muñiz et al., 2012; Hale et al., 2010) by showing that their protective effect is not uniform, but moderated by the composition of the workforce, particularly the percentage of employees with disabilities. This introduces a new theoretical dimension—inclusivity as a moderator of safety system effectiveness—that has received limited quantitative attention to date.

Third, by integrating multiple analytical approaches (descriptive, bivariate, ANOVA, logistic regression, and interaction models), the study demonstrates the value of a multi-method framework for understanding workplace safety outcomes. Finally, the results support emerging perspectives in occupational health and management (see, e.g., Schur et al., 2014) that highlight the intersection between inclusivity and resilience, suggesting that accessibility-orientated safety systems represent not only a compliance requirement, but also a strategic organisational capability.

8. CONCLUSIONS

This study examined the relationship between formal safety systems, investment capacity, training intensity, workforce diversity, and workplace accident outcomes in 547 Romanian SOEs. Using descriptive, bivariate, and multivariate analyses, the findings demonstrate that the presence of a formal safety system significantly reduces the probability of workplace accidents, with 41% lower odds of occurrence. However, its protective effect diminishes in organisations with higher percentages of employees with disabilities, underscoring the need for accessibility-oriented adaptations.

Training intensity emerged as the most consistent protective factor, lowering accident odds even after controlling for investment capacity and organisational size. Capital expenditure ratios were also associated with reduced severity of accidents, suggesting that investments in infrastructure and equipment contribute to the prevention of serious incidents. By contrast, a higher proportion of disabled employees was associated with a modest but statistically significant increase in both accident frequency and severity, highlighting persistent gaps in inclusive workplace design.

A central contribution of this study lies in identifying the interaction effect between safety systems and disability representation. This novel finding for the Romanian occupational safety context demonstrates that

standardised safety measures, while beneficial, are insufficient to maximise safety outcomes in diverse workforces. Without targeted accessibility adaptations, the benefits of safety systems are diminished in organisations with higher inclusion of disability.

Therefore, the results support the integration of formal safety systems, high-frequency training programmes, targeted capital investments, and inclusive design principles into national occupational safety strategies. Policymakers and SOE managers should ensure that safety protocols are not only compliant with EU directives, but also adapted to the needs of all employees, thereby strengthening both protection and equity in the workplace.

Future research should extend the analysis to multi-year datasets to assess trends over time, explore sector-specific effects to identify industry-level risks, and incorporate qualitative insights from employees to capture the lived experience of safety practices in inclusive environments. Together, these extensions would deepen the understanding of how inclusivity, investment, and organisational design shape workplace safety outcomes in the public sector.

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