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Impact of the occupational health and safety management system (OHSMS) on human talent management and organizational performance in the construction sector

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Objective: This study analyzes the impact of the Occupational Health and Safety Management System (OHSMS) on People Management (PM) and Organizational Performance (OP) in the construction sector, emphasizing its role in organizational sustainability and efficiency.

Methodology: A theoretical model was validated to evaluate the direct and mediated relationships between OHSMS, PM, and OP using Structural Equation Modeling (SEM). Data were collected from 239 workers across 50 construction companies in Norte de Santander, Colombia, through structured surveys and secondary institutional sources. Exploratory data analysis, Spearman correlations, and SEM were applied, confirming the instrument's reliability and construct validity.

Results: The OHSMS showed a significant direct effect on OP, which was substantially enhanced when mediated by PM. Key people management practices such as planning, participation, and continuous evaluation emerged as crucial links. Moreover, PM positively influenced OP dimensions such as wellbeing, equity, system perception, and job satisfaction.

Conclusion: Integrating OHSMS with strategic human resource practices is critical for optimizing organizational performance in high-risk sectors like construction. The findings offer practical guidelines for aligning safety systems with people management to foster sustainable and efficient organizations.

Practical implications: The study recommends embedding participatory mechanisms, training, and wellbeing strategies within OHSMS implementation to improve commitment and operational outcomes. These insights can inform business policies, organizational training programs, and future sectoral interventions.

KEYWORDS

workplace wellbeing, workplace environment, organizational performance, people management, structural equation modeling, occupational health and safety, organizational sustainability, ISO 45001

1 Introduction

Occupational Health and Safety Management Systems (OHSMS) have evolved from a traditional preventive focus to a comprehensive organizational strategy, where worker protection is not only a legal or ethical obligation but also a critical driver of sustainability, productivity, and resilience (Moran-Fuentes et al., 2022; OIT, 2020). A cornerstone of this evolution is the ISO 45001:2018 standard, which provides an internationally recognized framework for managing occupational health and safety risks. This standard emphasizes top management leadership, a risk-based thinking approach, and the active participation of workers as key principles for establishing a proactive and preventive safety culture. By integrating the Plan-Do-Check-Act (PDCA) cycle and aligning with other ISO management system standards, ISO 45001:2018 positions occupational health and safety as a strategic and systemic concern, essential for achieving continuous improvement and organizational excellence (International Organization for Standardization, 2018).

Nevertheless, global data continue to reflect significant shortcomings: each year, more than 2.78 million deaths and approximately 374 million non-fatal work-related injuries are reported, with serious implications for productivity, operational costs, and overall organizational performance (OIT, 2019). These figures suggest that the formal implementation of OHSMS frameworks remains insufficient unless they are aligned with other strategic functions, particularly human resource management (HRM), to promote a culture of prevention and sustained performance improvements (Alzoubi et al., 2022; Liu R. et al., 2023; Bethea et al., 2016; Lieberson and O'Connor, 1972).

Among the various economic sectors, the construction industry presents particularly complex challenges that underscore the necessity of such alignment. Marked by high employee turnover, multidisciplinary project environments, and hazardous tasks such as working at heights or in open-air settings, construction remains one of the most exposed sectors to occupational risks (Abdul Hamid et al., 2018). Despite its economic significance in Colombia, many construction firms still perceive the OHSMS primarily as a compliance requirement rather than as a strategic instrument for enhancing personnel management and achieving organizational objectives (Ulises et al., 2019; Obando-Montenegro et al., 2019).

In the Colombian context, Decree 1072 of 2015 mandates the implementation of OHSMS in all organizations, regardless of their size or sector, and explicitly encourages its integration with HRM practices (Ministerio del Trabajo, 2015). Empirical evidence indicates that when an OHSMS is strategically integrated with practices such as continuous training, participatory mechanisms, and employee recognition, it contributes positively to job satisfaction, organizational climate, and operational efficiency—dimensions that are central to organizational performance (Giunchi et al., 2019; Cárdenas Bohórquez et al., 2019; Barradas Martínez et al., 2021).

The present study is grounded in two complementary theoretical frameworks: Human Capital Theory and General Systems Theory. Human Capital Theory (Becker, 1994) posits that investments in employee health, safety, and training enhance individual productivity and, by extension, organizational outcomes. Within this framework, OHSMS can be conceptualized as a mechanism for strengthening human capital through the creation of safe, participatory, and motivating work environments.

Conversely, General Systems Theory (Bertalanffy, 1968) offers a holistic perspective on organizations, viewing them as dynamic systems composed of interdependent subsystems. Accordingly, OHSMS, People Management (PM), and Organizational Performance (OP) should not be understood as isolated components but as interconnected functions that interact and co-evolve. This systems-based view supports the idea that effective integration between safety and HRM practices can generate positive feedback loops that enhance organizational resilience, sustainability, and long-term effectiveness.

By articulating these theoretical foundations, the present study aims to analyze not only the direct effects of OHSMS on OP but also the mediated effects that emerge through strategic HRM practices. This integrated perspective provides a robust framework for the hypothesized relationships tested in the empirical model.

Despite notable advances in both safety management and HRM literature, a significant research gap persists concerning the mediating role of personnel management in linking OHSMS to organizational performance. Most existing studies examine these systems in isolation or focus solely on regulatory compliance, overlooking the potential synergies between them, particularly in high-risk contexts such as the construction sector.

To address this gap, this study analyzes the impact of OHSMS on PM and OP in the construction sector through a Structural Equation Modeling (SEM) approach. Drawing on data from construction companies in Ocaña, Norte de Santander, Colombia, the research seeks to identify the relationships between safety systems, employee engagement, and performance outcomes. Ultimately, the findings aim to inform both local and international audiences interested in advancing the strategic integration of occupational health, safety, and human resource management practices across diverse organizational contexts.

2 Literature review

Occupational health and safety management (OHSMS) has been widely studied from multiple perspectives, highlighting its role not only in the prevention of occupational risks, but also in promoting organizational wellbeing and improving business performance (Moran-Fuentes et al., 2022; Coppeta et al., 2019; Mandal and Chanodkar, 2024). In the current context, various authors agree that the OHSMS transcends the normative dimension and becomes an articulating system of organizational culture, particularly when linked to human talent management practices (Pujol- Cols and Lazzaro-Salazar, 2021; Ulises et al., 2019; Nuñez -Lira et al., 2023).

Human Capital Theory (HCT) offers a key conceptual framework for understanding personnel management as a strategic factor in organizational performance. From this perspective, recent studies highlight that investments in worker training, wellbeing, and development strengthen their skills and generate significant returns for organizations, expressed in greater productivity, commitment, and reduced occupational risks (Iqbal et al., 2023a; Gertler et al., 2016; Liu et al., 2015). Thus, human capital is conceived as a strategic

asset that, when properly managed through systems such as the OSHMS, contributes to the achievement of sustainable results and continuous improvement processes (Carnevale and Hatak, 2020).

Analyzing the OSHMS from a theoretical perspective allows us to understand its foundations, scope, and interactions with other organizational systems, beyond mere legal compliance. This approach makes it possible to establish causal and mediating relationships with variables such as human talent management and organizational performance, thus enriching intervention and evaluation strategies in organizations (Liu H.-C. et al., 2023; R. Liu et al., 2023b; Ramos et al., 2022).

Recent research has shown that safe work environments, together with effective implementation of OSHMS, create conditions conducive to staff engagement, reduce absenteeism and accident rates, and boost institutional performance (Giunchi et al., 2019; Cárdenas Bohórquez et al., 2019). These findings are even more relevant in high-risk sectors such as construction, where operating conditions demand a comprehensive preventive approach, aligned with the reality of field work (Abdul Hamid et al., 2018; Río-Cortina et al., 2022).

The literature has also addressed the relationship between human talent management and the success of the OSHMS. Research such as that by Moran-Fuentes et al. (2022) and Ulises et al. (2019) has shown that effective OSH programs require the active participation of workers, their perception of organizational justice and committed leadership (Soria Reséndez et al., 2019). Furthermore, it is highlighted that the integration of the OSHMS with human management strategies strengthens motivation, sense of belonging and productivity (Ibarra Cisneros et al., 2017; Céspedes Socarrás and Martínez Cumbrera, 2016).

From an assessment perspective, Gertler et al. (2016) propose the use of maturity instruments to assess the degree of implementation of the OHSMS and its impact on management teams' decision-making. These tools identify gaps in strategic planning, highlight the level of staff ownership, and measure its impact on the organization's overall performance.

On the other hand, Moran-Fuentes et al. (2022) reveal that factors such as physical load, organizational pressure, and poor communication negatively impact wellbeing and performance (Bakker et al., 2008; Gill and Pratt, 2008; Oraee et al., 2019). In this regard, Liu et al. (2025) emphasize how precarious conditions on digital platforms affect mental health, control, and job satisfaction, highlighting the need for psychosocial considerations in OHSMS. Likewise, Widyasmoro et al. (2025) stress the role of safety briefings, knowledge, and awareness in achieving zero accidents, underscoring the relevance of safety culture and engagement. These findings support the need to examine workers' perceptions as a core element of OSH management systems.

The literature also emphasizes that the success of OSHMS depends not only on legal compliance, but also on its cross-organizational appropriation (Pujol- Cols and Lazzaro-Salazar, 2021). This involves training workers, involving them in risk identification, encouraging participation, and designing inclusive policies that articulate occupational safety with human development processes (Sharma and Kodali, 2008; Céspedes Tamayo, 2020).

Finally, several studies warn of the risk of converting the OSHMS into a mere documentary practice. According to Gertler et al. (2016) and Barradas Martínez et al. (2021), when organizations do not allocate sufficient resources or promote active staff participation, systems tend to be limited to formal compliance, without generating a true transformation in working conditions or organizational culture.

Overall, the review shows that OSHMS management, when properly articulated with personnel management, has the potential to significantly improve organizational performance, especially in high-risk sectors such as construction, where structural challenges require comprehensive, participatory and strategic approaches (Mikalef and Krogstie, 2020).

In line with the theoretical and empirical findings reviewed, it is suggested that the effective implementation of the Occupational Health and Safety Management System (OHSMS) can have a significant impact on both human talent management and organizational performance. Several studies have shown that safe work environments, accompanied by integrated occupational health policies, contribute to improving motivation, employee engagement, and efficiency in meeting institutional objectives (Giunchi et al., 2019; Kahoa et al., 2019; ISO, 2018). Based on the above, the following hypotheses are formulated:

2.1 General hypotheses

H1: The implementation of the OSHMS significantly impacts personnel management in companies in the construction sector.

H2: The implementation of the OSHMS significantly impacts organizational performance in companies in the construction sector.

H3: Personnel management mediates the relationship between OSHMS and organizational performance.

To validate these hypotheses, a structural equation model was developed using a systemic approach to the three variables. The conceptual model as seen in Figure 1, illustrates the relationships between these variables and the mediating role of people management.

3 Methodology

This study adopted a descriptive and explanatory methodological approach, aimed at characterizing the variables Occupational Health and Safety (OHS), People Management (PM), and Organizational Performance (OP), as well as analyzing and explaining the relationships between them. The design allowed for a comprehensive understanding of the constructs, addressing both their individual characteristics and their interactions (Creswell and Plano Clark, 2018).

A mixed-source design was used, combining primary data obtained through surveys administered to managers and workers with secondary data from institutional reports and corporate websites (Tashakkori and Teddlie, 2010). Additionally, a contemporary cross-sectional design was employed to collect data at a single point in time, enabling the analysis of phenomena in their natural context (Hernández-Sampieri and Mendoza, 2018). The study population consisted of 50 construction companies located in

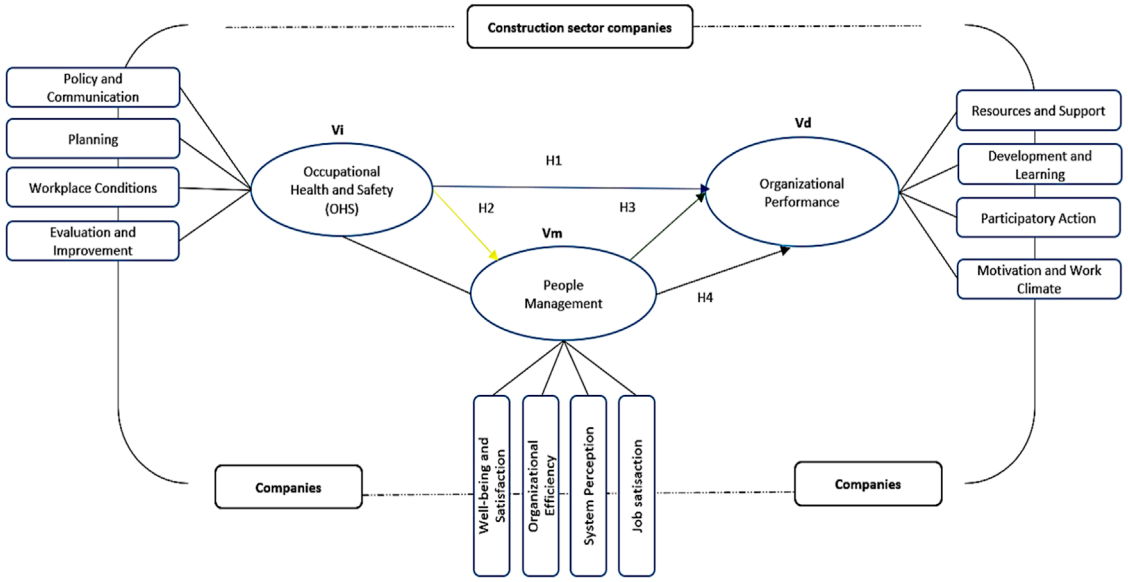

FIGURE 1
Conceptual model.

the municipality of Ocaña, Norte de Santander, Colombia. These companies were selected based on their operational status and formal registration, ensuring a representative sample across small and medium-sized enterprises (SMEs).

The sample included firms with varying workforce sizes, ranging from micro-enterprises with fewer than 10 employees to medium-sized companies with up to 200 workers, thereby capturing structural diversity within the sector. From this population, 239 workers were selected using proportional stratified random sampling to ensure equitable representation by hierarchical level and functional area. This strategy enabled a comprehensive understanding of the phenomena under investigation by incorporating the perspectives of managers, supervisors, and frontline workers.

The measuring instrument designed to assess the variables of occupational health and safety, people management and organizational performance underwent rigorous validity and reliability testing. Content validity was confirmed by five international experts, who evaluated the clarity, coherence, and relevance of the items, achieving an agreement index of 0.96. Reliability was validated using a Cronbach's alpha of 0.94, indicating high internal consistency (Cronbach, 1951). Sampling adequacy was verified using the Kaiser-Meyer-Olkin (KMO) measure, which yielded an overall value of 0.81, and Bartlett's test of sphericity was significant ($p < 0.05$), confirming the suitability of the data for factor analysis.

In the first phase of the analysis, exploratory data analysis (EDA) techniques were applied, including descriptive statistics, graphical visualization, and exploratory factor analysis (EFA), to examine the data structure, detect patterns, and construct latent factors (Hair et al., 2019). In the second phase, relational analysis was performed to assess the statistical interconnections between these factors, validating their associations and theoretical coherence before moving towards structural modeling. For the relational analysis, Spearman correlations, appropriate for ordinal data, were used, which allowed identifying significant associations between the studied variables and confirming the convergent validity of the constructs.

Subsequently, Structural Equation Modeling (SEM) was implemented with Python, including Confirmatory Factor Analysis (CFA) and the assessment of direct and indirect structural relationships between the independent variable (IV), the mediating variable (MV), and the dependent variable (DV). The overall model adequacy was assessed using fit indices such as the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). Python was selected due to its flexibility, open-source nature, and its ability to integrate advanced statistical libraries, which allow for customized model specification, reproducibility, and automation of analytical workflows. This choice also improved the replicability and scalability of the analysis, allowing for greater transparency in data processing. Throughout the process, the confidentiality and anonymity of participants were guaranteed. Primary data were collected and processed ethically and securely, and the use of Python contributed to a robust and reliable examination of the relationships between the variables studied. See Figure 2.

4 Results

The research results highlight not only the direct impact of Occupational Health and Safety (OHS) on Organizational Performance (OP), but also the fundamental role of People Management (PM) as a mediating variable in this relationship. These findings provide insight into the underlying dynamics that strengthen organizational sustainability and improve efficiency in contemporary business contexts. The most relevant findings of the study are presented below in Table 1.

As observed in Table 2, the variable Age shows a high positive correlation with Seniority (0.750), which is expected, since the older

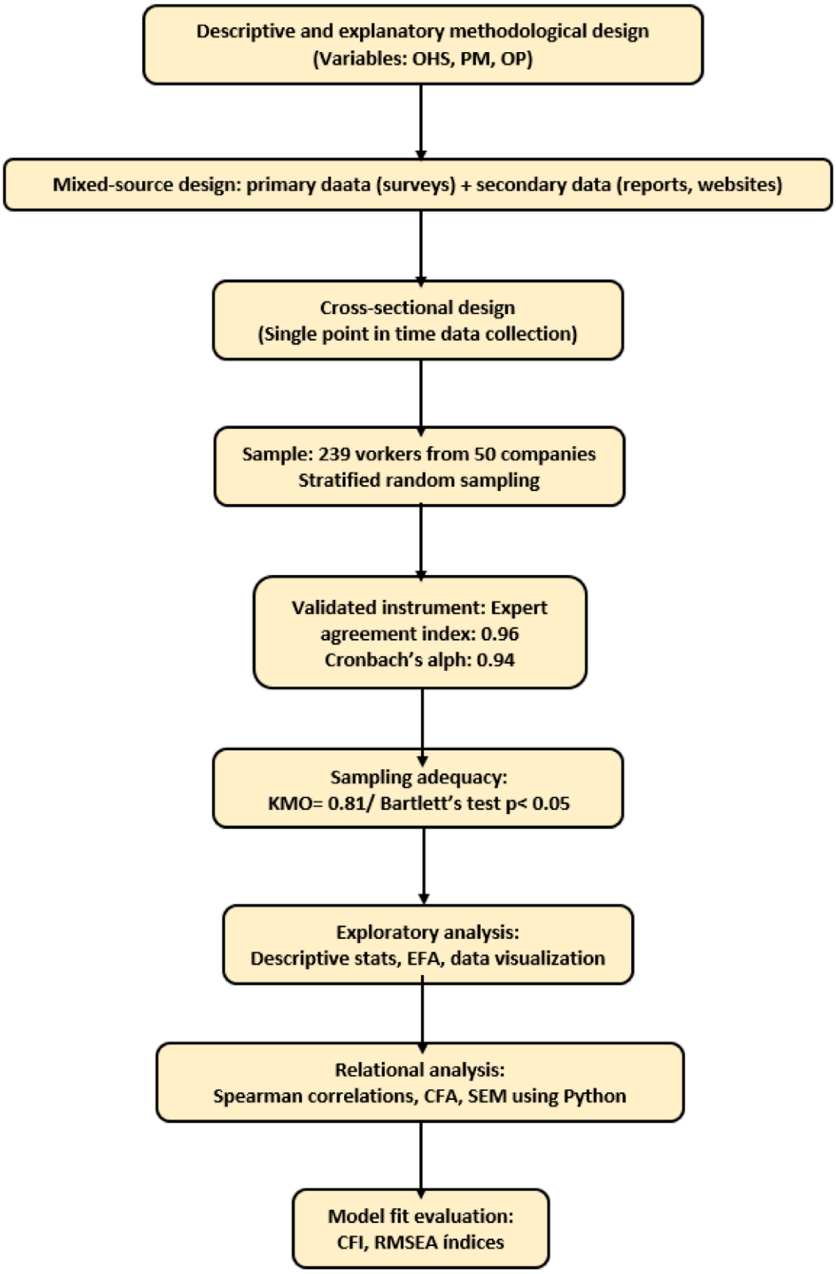

FIGURE 2
Methodological process.

the person, the more work experience he or she accumulates. On the other hand, there is a moderate negative correlation between Age and Education (−0.420), which could indicate that younger workers tend to achieve higher educational levels. Education shows a negative relationship between age and seniority, which could reflect a generational trend toward higher qualifications. A moderate positive correlation is also observed between Education and Contract Type (0.254), suggesting that workers with higher educational levels may be able to access more stable contracts. The remaining relationships present low correlation values, indicating weak or insignificant associations between the remaining variables.

The analysis of the results in Figure 3, reveals that people management is rated positively, with averages ranging from 4.0 to 4.2 across all indicators evaluated, reflecting a generally favorable perception. However, the relatively high standard deviations in dimensions such as DA2 and AP1 indicate significant variability in responses, suggesting that not all members of the organization experience the implemented management practices in the same way. This dispersion could be associated with differences in work contexts, roles, or leadership styles; therefore, it is recommended to delve deeper into these areas to strengthen consistency in the human talent experience.

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TABLE 1 Characterization of the population.

Dimensions	Characteristics	Stake
Gender	Male	68.1%
	Female	30.7%
	Non-binary	1.3%
Age	18–25 years old	13.0%
	26–35 years old	59.7%
	36–45 years old	22.7%
	46–55 years old	3.8%
	Over 55 years old	0.8%
Training	Bachelor	41.6%
	Professional	37.0%
	Postgraduate	14.7%
	Technological	5.0%
	Technical	1.7%
Seniority in the sector	Less than 1 year old	17.2%
	Between 1 and 5 years	60.9%
	Between 6 and 10 years	17.6%
	More than 10 years	4.2%
Type of contract	Fixed term	44.1%
	Indefinite term	33.2%
	Construction contract	17.6%
	Provision of services	4.6%
	Other	0.4%

Source: Own elaboration.

The results obtained in Figure 4, reflect a favorable evaluation of the OHSMS, with average scores close to 4.1 across all items, indicating solid implementation in aspects of policy, planning, working conditions, and evaluation. However, the standard deviations reveal some heterogeneity in respondents' perceptions, particularly in items related to planning (PLAN2) and conditions (COND2), suggesting that the experience is not entirely uniform across the organization. These findings point to opportunities for improvement in the standardization of practices, especially about the implementation of the action plan and the monitoring of working conditions.

The research results, as seen in Figure 5, reveal a largely favorable perception of organizational performance, with averages close to or above 4.0 for most indicators. This trend suggests that employees positively value key aspects such as institutional support, Occupational Health and Safety (OHS) planning, and the work environment. In particular, the Resources and Support (RS), Policies and Planning, and Motivation and Work Environment (MCL) dimensions stand out as strengths, reflecting a structured organizational environment with effective management support.

However, other areas show lower or contrasting levels. The Participation (PA) dimension presents low scores (PA1: 3.22, PA2: 3.06), reflecting a limited perception of employee inclusion in decision-making and continuous improvement processes. Similarly, the Physical Conditions (COND1 and COND2) receive average ratings (≈3.06), indicating opportunities for improvement in the tangible work environment. Regarding Evaluation (EVA), the usefulness of subsequent actions is recognized (EVA2: 4.01), although the consistency of the process remains poor (EVA1: 3.01).

Also notable is the low-to-medium score in the Personal Wellbeing (WW) dimension (3.13), which suggests that, despite organizational progress, challenges remain in balancing job demands and workers' subjective wellbeing. The high standard deviations in dimensions such as Overall Perception (PERC) and Job Satisfaction (SL) indicate significant variability in responses, which could be linked to differences by area, role, or hierarchical level.

The observed variability in perceptions regarding personal wellbeing and physical working conditions can be attributed to several organizational and individual-level factors. Differences in job roles, hierarchical levels, contract types, and length of service influence how employees experience occupational health and safety initiatives. For example, temporary workers or those in physically demanding roles may have limited access to supportive infrastructure, rest areas, or psychosocial resources, leading to lower wellbeing ratings. Furthermore, inconsistencies in the implementation of safety protocols across departments may exacerbate these perceptual gaps. To address these disparities, it is essential to adopt a differentiated intervention strategy that includes participatory diagnosis at the unit level, targeted wellbeing programs, and the harmonization of safety standards across all functional areas. Regular feedback mechanisms and inclusive planning processes can also foster equitable engagement and ensure that wellbeing initiatives are sensitive to the specific needs of diverse employee groups.

Overall, the findings show a solid implementation of the OHSMS, but with specific weaknesses in active participation, assessment consistency, and the promotion of comprehensive wellbeing. It is recommended to further analyze specific organizational units and develop targeted strategies that promote co-responsibility, self-care, and an inclusive and sustained organizational culture.

The analysis of the graphical frequency distribution by dimension reveals a generally positive perception of the Occupational Health and Safety Management System (OHSMS), with a clear inclination toward responses at levels 4 and 5 of the scale. This trend suggests that, overall, workers favorably value the system's implementation and operation, as seen in Tables 3 and 4.

The Resources and Support (RS) dimension presents high frequencies at the highest levels, indicating that staff perceive effective institutional support from management and responsible areas. Similarly, the Performance (PD) dimension shows a concentration of responses between 4 and 5, reflecting recognition of work performance and OSH-related technical training. In contrast, the Participation (PP) dimension shows a peak at level 3 and a low level at level 5,

TABLE 2 Correlation matrix of sociodemographic variables.

Variable	Age	Gender	Training	Antique	Contract
Age	1,000	0.092	−0.420	0.750	−0.052
Gender	0.092	1,000	−0.371	0.036	−0.132
Training	−0.420	−0.371	1,000	−0.376	0.254
Antique	0.750	0.036	−0.376	1,000	0.003
Contract	−0.052	−0.132	0.254	0.003	1,000

Source: Prepared by the authors.

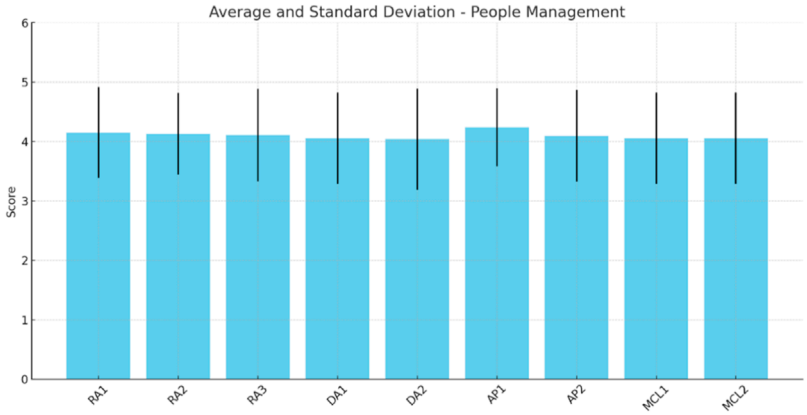

FIGURE 3
Average and standard deviation–people management.

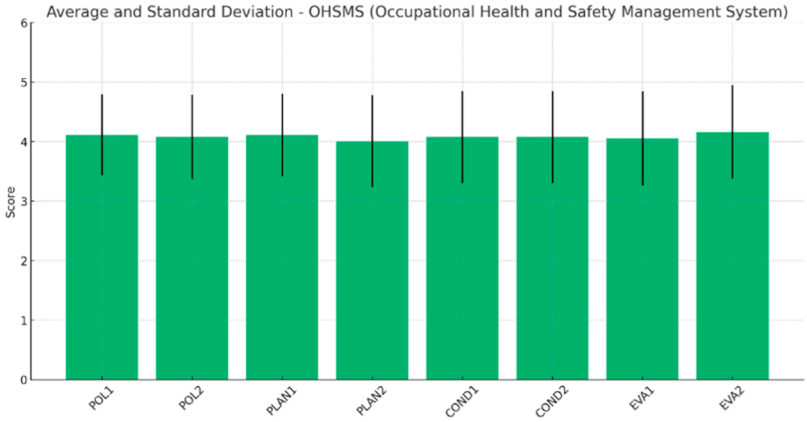

FIGURE 4
Mean and standard deviation–occupational health and safety.

which could be interpreted as a lack of real opportunities for workers to actively engage in OSHMS improvement processes. This suggests possible structural or communication barriers that limit collective appropriation of the system.

Overall, workers' perceptions of the OSHMS are favorable, with a distribution of responses skewed toward the higher levels of the scale. This demonstrates a consistently positive assessment of the system, particularly in dimensions such as Equity and Motivation (EQ, MCL) and Plans and Policies (PLAN, POL), which reflect a harmonious organizational climate and adequate dissemination of institutional guidelines. However, critical areas have been identified that require attention. Physical Conditions (PDC) are perceived as

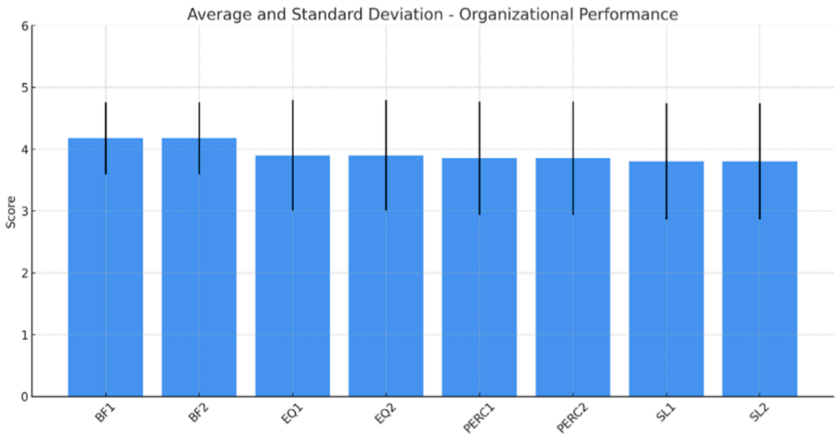

FIGURE 5
Mean and standard deviation–organizational performance.

TABLE 3 Descriptive results by dimension: workers' perception of the OHSMS, people management and organizational performance.

Dimension	Featured items	Approx. average	Interpretation
Resources and support (RA)	RA1–RA3	4.10	Very positive perception of institutional support
Training (DA)	DA1–DA2	4.00–4.03	OSH training positively valued
Participation (AP)	AP1 (3.22), AP2 (3.06)	↓	Low perception of worker participation
Motivation and climate (MCL)	MCL1, MCL2	4.03	Good work environment
Policies and planning	POL1–POL2, PLAN1–PLAN2	4.00–4.12	Good knowledge and execution of OHS plans
Physical conditions	COND1, COND2	3.06	Regular perception
Evaluation (EVA)	EVA1 (3.01), EVA2 (4.01)	Contrast	Improvement is recognized after evaluation, but consistency is lacking
Personal wellbeing (BF)	BF1, BF2	3.13	Medium-low level
Organizational equity (EQ)	EQ1, EQ2	3.83	Positive but with dispersion
General perception (PERC)	PERC1, PERC2	3.79	Favorable evaluations of the OHSMS.
Job satisfaction (SL)	SL1, SL2	3.72	Acceptable, but with great variation

average, indicating opportunities for improvement in the workplace infrastructure. The Assessment (AVA) dimension shows partial progress: although improvements are recognized after corrective actions, continuous assessment is not perceived as a consolidated practice. Likewise, Personal Wellbeing (PW) has a medium-low rating, which could affect organizational sustainability and talent retention.

Job satisfaction (JS), although more variable, maintains a positive trend, while the differences observed between items indicate internal consistency in most of the dimensions evaluated. Finally, it is recommended to prioritize interventions on three key fronts: employee participation, physical conditions, and periodic evaluation of the system, since strengthening them is essential to maintaining organizational commitment, especially in environments with high turnover.

4.1 Participation and inclusion in the OHSMS

The results reveal that workers with greater contractual stability (permanent or contract-based) tend to perceive greater inclusion in the participatory processes of the OHSMS. This finding coincides with that reported by Soria Reséndez et al. (2019), who highlight that active participation improves the perception of belonging and organizational commitment. In contrast, those who are linked through temporary contracts or by the provision of services express a lower perception of participation and listening, which suggests structural barriers in the integration of these groups (Mutlu and Altuntas, 2019). Furthermore, it is observed that more recent employees and those with longer careers feel more involved in decision-making, while those with medium seniority present a more

TABLE 4 Perception trends by dimension: graphical analysis of responses on the OHSMS, people management and organizational performance.

Category/dimension	Trend observed in the graph	Inference
Resources and support (RA)	High frequencies in 4 and 5	Staff perceive good institutional support
Performance (DA)	Concentrated in 4–5	Recognition of labor compliance
Participation (AP)	Peak at 3, lower at 5	Indicates a lack of clarity or opportunities to get involved
Physical conditions (COND)	Predominance of responses 3 and 4	Regular perception of the work infrastructure
Evaluation (EVA)	EVA1 focused on 3; EVA2 on 4–5	Perceived improvement after corrective actions, but regular evaluation is lacking
Personal wellbeing (BF)	Answers focused on 3 and 4	Medium-low perception, potential for improvement
Equity and motivation (EQ, MCL)	Highly favorable	Highly valued organizational climate
Plans, policies (PLAN, POL)	Strongly concentrated in 4 and 5	Knowledge and clear implementation of the OHSMS.
Job satisfaction (SL)	Variability, but a positive trend	Acceptable perception of job satisfaction

distant or critical perception, a phenomenon also reported in the studies by Bakker et al. (2008) on the fluctuation of work engagement throughout the organizational life cycle.

4.2 Perception of equity, respect and justice

Regarding the perception of fairness and respect within the system, it is evident that workers with stable contracts present more positive assessments, while those with precarious contracts display a more critical view (Becher et al., 2018). Likewise, the perception of organizational justice is more favorable among those with less or more seniority, while those with medium careers express higher levels of skepticism, as also documented by Gill and Pratt (2008) in studies on the perception of justice in the workplace.

4.3 Evaluation, feedback and continuous improvement

Regarding OHSMS evaluation processes, employees with permanent or contract-based contracts report greater confidence in correcting errors and implementing improvements, a finding that aligns with what Alessa et al. (2020) reported on the relationship between job stability and the perception of the effectiveness of safety systems. Workers with temporary contracts show distrust, possibly associated with their lower access to strategic information (Guarini, 2005). Furthermore, it is reaffirmed that organizational commitment is stronger at extremes of seniority (new and veteran), while workers with intermediate seniority tend to evaluate feedback processes more critically.

4.4 Resource management and distribution

Regarding the management of resources allocated to the OHSMS, it was found that more recent employees and those with more experience perceive a better allocation of resources, possibly due to more recent or accumulated experiences (Muhammed and Zaim, 2020). In contrast, those with intermediate seniority express greater skepticism, similar to the findings of Carnevale and Hatak (2020) on the perception of inequity in the distribution of resources during organizational transitions. Furthermore, women and non-binary people tend to evaluate the distribution more positively, which suggests differences in the perception of equity according to gender, as proposed by recent studies on labor inclusion (Hongal and Kinange, 2020).

4.5 Satisfaction and perceived wellbeing

Finally, in terms of overall satisfaction with the occupational health and safety system, employees with permanent or contract-based contracts reported higher levels of perceived wellbeing (Iqbal et al., 2023a; Iqbal et al., 2023b). Conversely, temporary workers reported lower levels of satisfaction, reinforcing the findings of Omran et al. (2021) on the impact of contract type on perceived institutional commitment and workplace wellbeing.

As shown in Table 5, the reliability and sampling adequacy analysis revealed that the three dimensions evaluated—People Management, OSH-MS, and Organizational Performance—present high levels of internal consistency, with Cronbach's alpha coefficients above 0.94, indicating excellent reliability of the instruments used. Furthermore, Bartlett's test of sphericity yielded significant values ($p < 0.001$), confirming the existence of sufficiently strong correlations between the items in each construct. Meanwhile, the Kaiser-Meyer-Olkin (KMO) sampling adequacy index exceeded the 0.85 threshold in all three dimensions, demonstrating that the data are suitable for the application of multivariate techniques such as factor analysis or structural equation modeling. Together, these results support the statistical soundness of the questionnaire and the relevance of the empirical analysis conducted in the study.

As shown in Table 6, the reliability and validity analysis of the measured constructs revealed highly satisfactory psychometric

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TABLE 5 Reliability analysis.

Construct	Cronbach's alpha	Bartlett's test	Kaiser-Meyer-Olkin test
People management	0.947	1254.63***	0.902
OHSMS	0.941	1135.72***	0.887
Organizational performance	0.952	1349.85***	0.914

In the Bartlett's test of sphericity, the presence of three asterisks (***) indicates a p-value less than 0.001, denoting a highly significant result. This suggests that the correlation matrix is not an identity matrix and that factor analysis is appropriate for the data.

TABLE 6 Reliability and validity indicators by construct.

Construct	ALPHA	ALPHA.ORD	OMEGA	BIRD
People management	0.947	0.973	0.952	0.915
OHSMS	0.941	0.965	0.946	0.902
Organizational performance	0.952	0.978	0.957	0.928

results. Internal consistency coefficients (Cronbach's α) ranged from 0.941 to 0.952, indicating excellent reliability for the scales used to measure People Management, OSH-MS, and Organizational Performance. Likewise, Ordinal Alpha values exceeded the 0.96 threshold in all three cases, reaffirming the stability of the measurements on Likert-type ordinal scales. Omega coefficients, considered more robust to the heterogeneity of factor loadings, also remained at optimal levels (≥0.946). Finally, the average variance extracted (AVE) yielded values greater than 0.90 for all constructs, confirming high convergent validity, i.e., that the items used consistently capture the underlying theoretical concept. These findings empirically support the quality of the instrument applied and reinforce the validity of the subsequent analyses developed in the study.

4.6 Exploratory data analysis (EDA)

Table 7 shows that the exploratory analysis of the Organizational Performance (OP) indicators, as well as constructs related to Occupational Health and Safety (OHS) and People Management (PM), revealed a positive overall perception, supported by high levels of reliability and validity in the scales used. In terms of reliability, all constructs obtained Cronbach's alpha coefficients above 0.800, with "Work environment and staff retention" (0.963) and "Participation and cooperation" (0.964) being the most notable, indicating high internal consistency among the items. Regarding factorability, the Kaiser-Meyer-Olkin (KMO) test values were above 0.800 for most constructs, supporting the sampling adequacy for factor analysis. Noteworthy results include 0.919 for "Work Environment and Retention" and 0.896 for "Personnel

TABLE 7 Validity and reliability of the evaluated dimensions.

Dimension	Cronbach's alpha	Bartlett's test	KMO
Resources and support (RA)	0.936	980.25***	0.892
Performance (DA)	0.921	875.64***	0.873
Participation (AP)	0.884	703.18***	0.802
Physical conditions (COND)	0.861	642.45***	0.776
Evaluation (EVA)	0.902	788.10***	0.815
Personal wellbeing (BF)	0.867	721.87***	0.798
Equity and motivation (EQ, MCL)	0.945	1025.66***	0.910
Plans, policies (PLAN, POL)	0.938	989.44***	0.895
Job satisfaction (SL)	0.889	765.33***	0.822

In the Bartlett's test of sphericity, the presence of three asterisks (***) indicates a p-value less than 0.001, denoting a highly significant result. This suggests that the correlation matrix is not an identity matrix and that factor analysis is appropriate for the data.

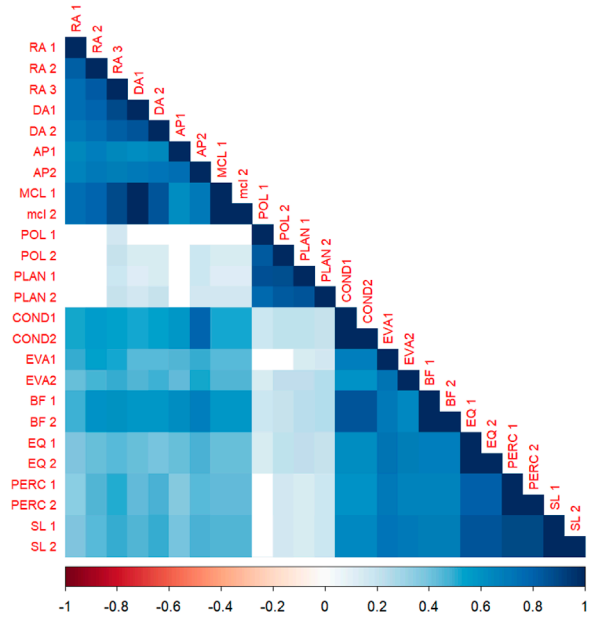

FIGURE 6
Significant correlations (Spearman).

Management." While the construct "Flexibility and Adaptability" had a KMO value of 0.674, this is within the acceptable threshold for inclusion in the analysis. Bartlett's test of sphericity was statistically significant ($p < 0.05$) for all constructs, confirming the existence of sufficient correlations between the items.

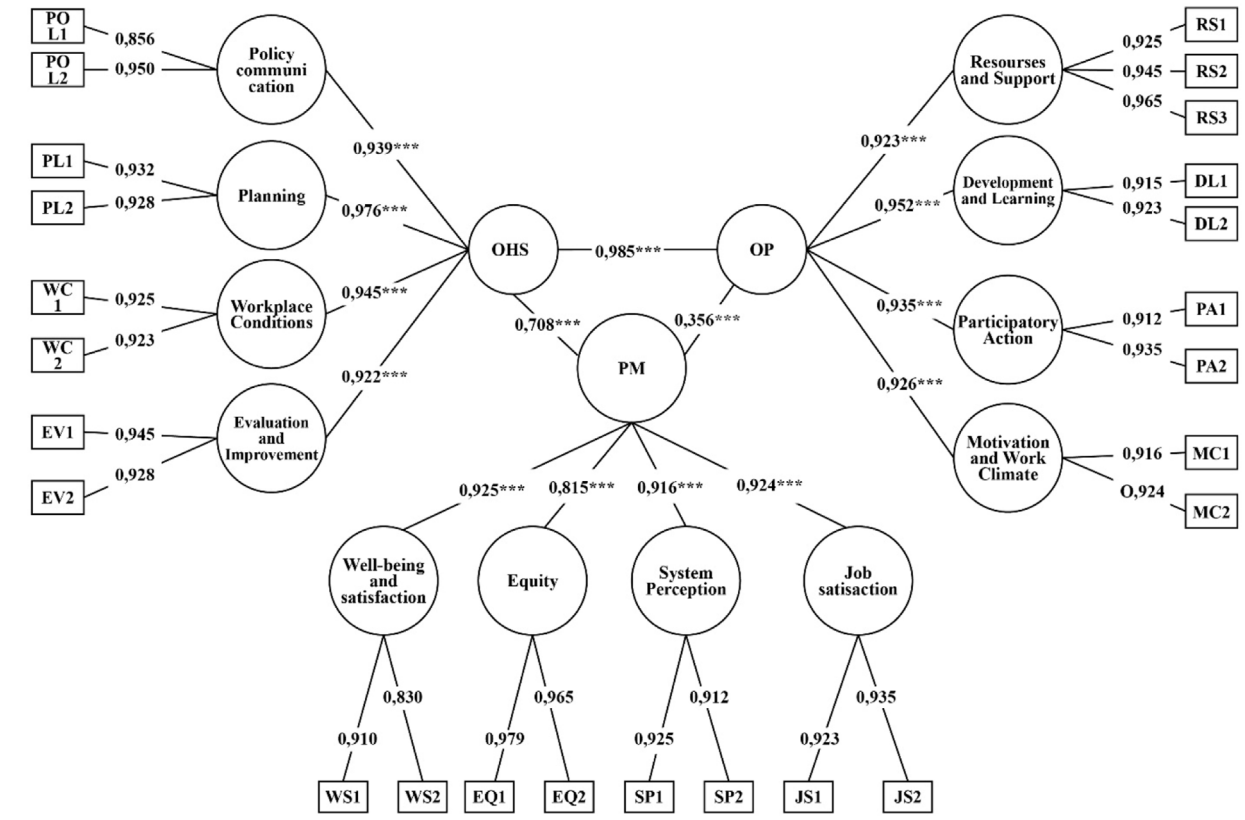

FIGURE 7
SEM model.

4.7 Relational analysis of variables

The Spearman correlation matrix shows high internal consistency among items in most of the dimensions analyzed, especially in Resources and Support (RA), Plans and Policies (PLAN, POL), Organizational Equity (EQ), and Job Satisfaction (SL), where correlations frequently exceed 0.80. This supports the convergent validity and internal consistency of these constructs. Significant relationships are also observed between different dimensions, such as between Motivation and Climate (MCL) and Job Satisfaction (SL), confirming their theoretical interdependence. On the other hand, Physical Conditions (COND) and Evaluation (EVA) present lower correlations, suggesting a more heterogeneous perception and areas for improvement in their implementation. Overall, the results validate the structure of the proposed model and reinforce the relevance of moving toward confirmatory factor analysis (see Figure 6).

4.8 Structural equation modeling (SEM)

Confirmatory analysis was developed using Structural Equation Modeling (SEM) to assess direct and indirect relationships between observable and latent variables, validating a complex theoretical model from an integrated perspective. A second-order model was used to represent hierarchical constructs such as Occupational Health and Safety (OHS), People Management (PM), and Organizational Performance (OP), which allowed for establishing precise links between theory and data.

For the estimation of the model, the Diagonally method was used. Weighted Least Squares (DWLS), suitable for Likert-type ordinal data, and parameters were optimized using the NLMINB algorithm. The procedure was implemented in R using the LAVAAN and SEMINR libraries, under rigorous global, structural, and measurement fit criteria.

4.9 Goodness-of-fit indices

The model results demonstrate a robust fit, as summarized in Table 5. The chi-square statistic was $\chi^2 = 4646$, with 1933 degrees of freedom, giving a χ^2/DF ratio of 2.403, within the acceptable range (between 2 and 5). The RMSEA index was 0.083, indicating a reasonably good fit. The CFI, TLI, NFI, GFI, and AGFI indices all reached values of 0.999, comfortably exceeding the threshold of 0.90, demonstrating an excellent fit of the proposed model. The SRMR index was 0.048, also confirming an optimal fit.

After confirming the reliability and validity of the constructs through internal consistency and factorial validity analyses, the

structural model was evaluated. As an initial step, collinearity between variables was examined using the Variance Inflation Factor (VIF). Although most constructs had VIF values below 5, some indicators—such as "Planning" (VIF = 5.93), "Participation and Action" (VIF = 5.22), and "System Perception" (VIF = 5.47)—slightly exceeded this threshold, without revealing critical collinearity issues that would affect the stability of the model.

Subsequently, the significance and relevance of the direct and indirect causal relationships were analyzed, using confidence levels of 99% (***), 95% (**), and 90% (*). The results obtained in the structural model confirmed statistically significant associations that support the validity of the proposed theoretical model.

Regarding structural relationships, it was found that Occupational Safety and Health (OSH) has a strong direct influence on Organizational Performance (OP) ($\beta = 9.85$; $Z = 12.371$; $p < 0.001^{***}$), as well as a positive influence on People Management (PM) ($\beta = 0.708$; $Z = 10.223$; $p < 0.001^{***}$). In turn, People Management (PM) has a moderate but significant impact on Organizational Performance (OP) ($\beta = 0.356$; $Z = 2.892$; $p < 0.01^{**}$), which confirms its role as a partial mediating variable in the model.

These findings reflect that strengthening OSH-related practices not only has a direct effect on improving institutional performance, but also acts through strong people management, capable of translating the environment of safety, support, and evaluation into concrete actions that positively impact organizational performance. The graphic representation of the model and its coefficients can be seen in Figure 7.

4.9.1 Evaluation of the structural model

Three key relationships were evaluated, all with statistically significant results:

Relationship	Standardized coefficient (β)	Significance
OHS → OP (OHS → Organizational Performance)	0.985	***(p < 0.001)
OHS → PM (OHS → People Management)	0.708	***(p < 0.001)
PM → OP (People Management → Performance)	0.356	**(p < 0.01)

The results presented in the table above provide empirical evidence supporting the relationships proposed in the structural model. Occupational Health and Safety (OHS) shows a direct, positive, and robust association with People Management (PM), indicating that organizational contexts with clear policies, effective planning, adequate working conditions, and continuous improvement processes significantly strengthen human talent management.

The study revealed that the implementation of an Occupational Health and Safety Management System (OHSMS) has a significant direct effect on Organizational Performance (OP). In turn, People Management is positively associated with OP, confirming its role as a key enabler for achieving better organizational outcomes. While the direct relationship between OHSMS and OP is significant, its coefficient is lower than the indirect effect mediated by People Management. These findings suggest that effective human resource practices (focused on wellbeing, equity, organizational perception, and job satisfaction) not only enhance employee experience but also amplify the positive impact of OHSMS on performance indicators.

However, some variability in employees' perceptions of personal wellbeing and physical working conditions was observed. This disparity may stem from differences in job roles, employment contracts, or uneven implementation of safety protocols. To address these gaps, it is recommended to implement targeted interventions based on unit-level diagnoses, ensure consistency in safety standards, and strengthen inclusive wellbeing strategies that adapt to the diverse needs of the workforce.

5 Discussion

The analysis of the structural model applied to 50 companies in the construction sectorin Norte de Santander allowed us to empirically validate the influence of Occupational Health and Safety (OHS) on Organizational Performance (OP), both directly and mediated by People Management (PM). This finding is consistent with recent research that underscores the strategic importance of integrating occupational health management into the core of organizational policies (Moran-Fuentes et al., 2022; Alzoubi et al., 2022).

From a structural perspective, the results showed that OHS has a strong and statistically significant direct effect on OP ($\beta = 0.985^{***}$), as well as an indirect effect through PM ($\beta = 0.708^{***}$), the latter being equally significant in its positive influence on performance ($\beta = 0.356^{**}$). These results agree with what was proposed by Giunchi et al. (2019), who highlight that wellbeing, participation and the perception of organizational support mediate the effects of safety systems in improving organizational performance.

The finding that the dimensions related to wellbeing, equity, system perception and job satisfaction presented high factor loadings reinforces the positions of Gertler et al. (2016) and Bakker et al. (2008), who argue that performance does not depend exclusively on technical efficiency, but on the quality of working conditions and the worker's sense of belonging.

Likewise, the results where indicators such as resource availability, active participation and work environment emerge as significant predictors of OP align with the approaches of Mutlu and Altuntas (2019) and Carnevale and Hatak (2020), who argue that human factors are critical for organizational sustainability, even more than traditional operational factors. From a theoretical framework, these results reinforce the validity of the General Systems Theory (Bertalanffy, 1968; Senge, 1990), by demonstrating that the effective interaction between organizational subsystems - in this case, occupational health, human management and performance - allows achieving synergies that enhance overall results. The empirical evidence of the partial mediation exercised by People Management constitutes a relevant contribution,

corroborating previous proposals such as those of Ulises et al. (2019) and Moran-Fuentes et al. (2022), which indicate that occupational health systems are more effective when they are strategically integrated with human talent development policies.

To improve participation, equity, and wellbeing in high-risk construction environments, it is recommended to implement participatory safety committees, ensure equitable access to equipment, rest breaks, and training, and integrate physical and mental wellbeing programs into the daily work routine. Additionally, periodic audits and the collection of disaggregated feedback are suggested to identify gaps in the implementation of occupational health and safety policies. These actions strengthen the preventive culture and reinforce the human-centered approach of management systems in demanding work settings.

The findings suggest that enhancing occupational health and safety practices, when complemented by effective people management, can help address challenges such as hazardous working conditions and high staff turnover. As the study highlights, "people management acts as an important mediator in the relationship between occupational health and safety practices and organizational performance," emphasizing the importance of aligning safety systems with strategies that promote engagement and retention. Furthermore, consistent with Kristensen et al. (2005), improving the psychosocial work environment (through participation, equity, and recognition) can reduce stressors and strengthen organizational commitment, contributing to more stable and safe workplaces.

This study advances Human Capital Theory and General Systems Theory by showing that investments in OHS and people management improve organizational performance. Supporting Becker (1994), it highlights how worker wellbeing enhances workforce value, while also aligning with Bertalanffy's (1968) view of organizations as interdependent systems. These findings underscore the need for integrated strategies and suggest further research on the long-term effects of OHSMS across different industries.

Finally, the findings invite us to rethink traditional approaches that conceive the OHSMS as a merely regulatory requirement, proposing instead its incorporation as a strategic axis that not only protects workers' health but also acts as a catalyst for organizational performance (Pujol Cols and Lazzaro-Salazar, 2021; Liu R. et al., 2023).

6 Conclusion

This study confirms that Occupational Health and Safety (OHS) is a strategic factor in improving the construction sector's Organizational Performance (OP). While its direct impact is significant, the effect is substantially amplified when combined with strong People Management (PM) practices centered on wellbeing, equity, organizational perception, and job satisfaction.

Moreover, organizational practices such as effective policy communication, continuous evaluation, participatory planning, and efforts to strengthen the work environment not only influence institutional performance but also contribute to building an organizational culture rooted in care, fairness, and the sustainable management of human capital.

In addition, the study highlights the strategic role of the Occupational Health and Safety Management System (OHSMS), not only in enhancing organizational performance but also in promoting a culture of wellbeing and equity. Embedding OHSMS within the core of organizational strategy enables companies to move beyond mere regulatory compliance and proactively create inclusive, safe, and resilient workplaces. This systemic integration fosters institutional trust, mitigates health-related risks, and promotes a shared sense of responsibility at all organizational levels.

To maximize the impact of OHSMS on organizational performance, it is recommended to align it with human resource management practices through coordinated actions such as participatory safety planning, regular feedback mechanisms, comprehensive wellness programs, and equity-focused leadership. Integrating these elements allows organizations not only to safeguard their workforce but also to strategically leverage human capital as a driver of long-term performance, adaptability, and innovation.

Taken together, the study provides an empirical foundation for designing intervention strategies that systematically integrate occupational safety, human resource management, and organizational performance as an interdependent system. The findings emphasize the importance of adopting a holistic approach that aligns institutional values with the practical implementation of strategy, resulting in tangible benefits in productivity, engagement, and long-term organizational sustainability.

6.1 Limitations of the study

Among the study's main limitations is its focus on construction companies in a specific region of Colombia, which limits the generalization of the results to other contexts or economic sectors. Furthermore, data collection was conducted at a single point in time, so the analysis represents a static snapshot of the phenomenon, without considering temporal or evolutionary variations.

Moderating or external variables such as digitalization, prior organizational culture, or hierarchical structure, which could play a relevant explanatory role in more complex contexts, were also not included.

6.2 Future lines of research

It is suggested that the research be expanded to other economic sectors and geographic regions, including comparative studies at the national and international levels. It is also recommended to implement longitudinal research to observe the evolution of the relationship between OSH, Occupational Risk Management, and OP over time, as well as sectoral comparisons.

Another line of interest is to incorporate moderating variables such as the degree of digital transformation, sustainability, or labor flexibility. Finally, it would be pertinent to use mixed methodologies that integrate qualitative analysis to delve deeper into the perceptions, narratives, and internal dynamics that shape the constructs addressed in this study.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

GN: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Supervision, Writing – original draft, Writing – review and editing. JB: Writing – original draft, Writing – review and editing. JA: Writing – original draft, Writing – review and editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Abdul Hamid, A. R., Abd Majid, M. Z., and Singh, B. (2018). Causes of accidents at construction sites. *Malays. J. Civ. Eng.* 20 (2). doi:10.11113/mjce.v20.15769

Alessa, F. M., Nimbarte, A. D., and Sosa, E. M. (2020). Incidences and severity of wrist, hand, and finger injuries in the U.S. mining industry. *Saf. Sci.* 129, 104792. doi:10.1016/j.ssci.2020.104792

Alzoubi, H. M., In', M., Airat, N. A., and Ahmed, G. (2022). Investigating the impact of total quality management practices and Six Sigma processes to enhance the quality and reduce the cost of quality: the case of Dubai. *Int. J. Bus. Excell.* 27 (1), 94. doi:10.1504/IJBEX.2022.123036

Bakker, A. B., Schaufeli, W. B., Leiter, M. P., and Taris, T. W. (2008). Work engagement: an emerging concept in occupational health psychology. *Work Stress* 22 (3), 187–200. doi:10.1080/02678370802393649

Barradas Martínez, M. del R., Lázaro, J. R., and Espinoza, I. M. (2021). "Desempeño organizacional: Una revisión teórica de sus dimensiones y forma de medición," in *Revista de Estudios en Contaduría, Administración e Informática*. Available online at: https://www.redalyc.org/journal/6379/637968301002/637968301002.pdf.

Becher, H., Dollard, M., Smith, P., and Li, J. (2018). Predicting circulatory diseases from psychosocial safety climate: a Prospective Cohort Study from Australia. *Int. J. Environ. Res. Public Health* 15 (3), 415. doi:10.3390/ijerph 15030415

Becker, G. S. (1994). *Human capital: a theoretical and empirical analysis with special reference to education*. 3rd ed. Chicago: University of Chicago Press.

Bertalanffy, L. (1968). *General system theory: foundations, development, applications*. New York, NY: George Braziller.

Bethea, A., Samanta, D., Willis, J. A., Lucente, F. C., and Chumbe, J. T. (2016). Substance exposure and helmet use in all-terrain vehicle accidents: nine years of experience at a level 1 trauma center. *J. Saf. Res.* 59, 61–67. doi:10.1016/j.jsr. 2016.09.006

Cardenas Bohorquez, S. J., Rodriguez Rojas, Y. L., Hernandez Cruz, H. W., and Monroy Silva, M. V. (2019). "Integration of health and safety at work in the management of public organizations in Bogotá D.C," in *2019 Congreso internacional de innovación y tendencias en ingeniería (CONIITI)* (IEEE), 1–5. doi:10.1109/CONIITI48476.2019.8960887

Carnevale, J. B., and Hatak, I. (2020). Employee adjustment and well-being in the era of COVID-19: implications for human resource management. *J. Bus. Res.* 116, 183–187. doi:10.1016/j.jbusres.2020.05.037

Céspedes Socarrás, G. M., and Martínez Cumbrera, J. M. (2016). Un análisis de la seguridad y salud en el trabajo en el sistema empresarial cubano. *Rev. Latinoam. Derecho Soc.* doi:10.1016/j.rlds.2016.03.001

Céspedes Tamayo, L. (2020). La cultura organizacional y su gestión desde un enfoque estratégico una revisión bibliográfica, análisis y valoraciones. Available online at: https://www.redalyc.org/articulo.oa?id=672371459008.

Coppeta, L., Pietroiusti, A., Lieto, P., Ferraro, M., Grelli, S., Stillo, M., et al. (2019). Measles immunity in an Italian teaching hospital. *Occup. Med.* 69 (2), 143–145. doi:10.1093/occmed/kqy132

Creswell, J. W., and Plano Clark, V. L. (2018). *Designing and conducting mixed methods research*. 3rd edn. Thousand Oaks, CA: SAGE Publications.

Gertler, P., Martinez, S., Rawlings, L. B., Premand, P., and Vermeersch, C. M. J. (2016). *Impact evaluation in practice*. Second Edition. Washington, D. C. doi:10.18235/0006529

Gill, R., and Pratt, A. (2008). In the social factory? *Theory Cult. Soc.* 25 (7–8), 1–30. doi:10.1177/0263276408097794

Giunchi, M., Vonthron, A.-M., and Ghislieri, C. (2019). Perceived job insecurity and sustainable wellbeing: do coping strategies help? *Sustainability* 11 (3), 784. doi:10.3390/su11030784

Guarini, M. R. R. (2005). "Italy maria rosaria di nucci 197," in *Handbook of renewable energies in the European union* (Peter Lang). doi:10.3726/978-3-653-01905-6/17

Hair, J. F., Black, W. C., Babin, B. J., and Anderson, R. E. (2019). *Multivariate data analysis*. 8th edn. Cengage Learning.

Hernández-Sampieri, R., and Mendoza, C. (2018). *Metodología de la investigación: Las rutas cuantitativa, cualitativa y mixta*. 1st edn. Ciudad de México: McGraw-Hill Education.

Hongal, P., and Kinange, U. (2020). A study on talent management and its impact on organization performance- an empirical review. *Int. J. Eng. Manag. Res.* 10 (01), 64–71. doi:10.31033/ijemr.10.1.12

Ibarra Cisneros, M. A., González Torres, L. A., Demuner Flores, M., and del, R. (2017). Competitividad empresarial de las pequeñas y medianas empresas manufactureras de Baja California. *Estud. Front.* 18 (35), 107–130. doi:10.21670/ref.2017.35.a06

International Organization for Standardization (2018). *ISO 45001:2018. Occupational health and safety management systems — requirements with guidance for use*. Geneva: ISO.

Iqbal, S., Razalli, M. R., and Taib, C. A. B. (2023a). Influence of intrinsic and extrinsic motivation on higher education performance: mediating effect of quality culture. *Front. Educ.* 8. doi:10.3389/feduc.2023.1099415

Iqbal, S., Taib, C. A., and Razalli, M. R. (2023b). The nexus between leadership styles and organizational performance: the mediating role of quality culture. *Qual. Assur. Educ.* 31 (4), 600–615. doi:10.1108/QAE-03-2023-0038

Kahoa, I. G. A., Yéboué-Kouamé, B. Y., Soya, J., Kouadio, J. H., Eba, A. J., and Boa, A. (2019). La problématique de l'application des mesures de prevention des accidents du travail et maladies professionnelles dans les entreprises affiliées à la Caisse nationale de prévoyance sociale (CNPS) à Abidjan. *Archives des Maladies Prof. de l'Environnement* 80 (2), 115–124. doi:10.1016/j.admp.2019.01.005

Kristensen, T. S., Hannerz, H., Hogh, A., and Borg, V. (2005). The Copenhagen Psychosocial Questionnaire – a tool for the assessment and improvement of the psychosocial work environment. *Scand. J. Work, Environ. Health* 31 (6), 438–449. doi:10.5271/sjweh.948

Lieberson, S., and O'Connor, J. F. (1972). Leadership and organizational performance: a study of large corporations. *Am. Sociol. Rev.* 37 (2), 117. doi:10.2307/2094020

Liu, H.-C., Liu, R., Gu, X., and Yang, M. (2023a). From total quality management to Quality 4.0: a systematic literature review and future research agenda. *Front. Eng. Manag.* 10 (2), 191–205. doi:10.1007/s42524-022-0243-z

Liu, J., Mooney, H., Hull, V., Davis, S. J., Gaskell, J., Hertel, T., et al. (2015). Sustainability. Systems integration for global sustainability. *Science* 347 (6225), 1258832. doi:10.1126/science.1258832

Liu, R., Liu, H.-C., Shi, H., and Gu, X. (2023b). Occupational health and safety risk assessment: a systematic literature review of models, methods, and applications. *Saf. Sci.* 160, 106050. doi:10.1016/j.ssci.2022.106050

Liu, Y.-L., Cheng, Y., Tsai, P.-H., Yang, Y.-C., Li, Y.-C., and Cheng, W.-J. (2025). Psychosocial work conditions and health status of digital platform workers in Taiwan: a mixed method study. *Saf. Sci.* 182, 106722. doi:10.1016/j.ssci.2024.106722

Mandal, T. K., and Chanodkar, A. (2024). Impact of HR practices on organizational performance: a review. *Unnayan* 16 (1), 73–88. Available online at: https://www.researchgate.net/publication/378143533

Mikalef, P., and Krogstie, J. (2020). Examining the interplay between big data analytics and contextual factors in driving process innovation capabilities. *Eur. J. Inf. Syst.* 29 (3), 260–287. doi:10.1080/0960085X.2020.1740618

Ministerio del Trabajo (Colombia) (2015). Decreto 1072 de 2015. Por medio del cual se expide el Decreto Único Reglamentario del Sector Trabajo. *Bogotá D.C. Minist. del Trab.* Available online at: https://www.funcionpublica.gov.co/eva/gestornormativo/norma.php?i=63432.

Moran-Fuentes, J. J., Carlos-Ornelas, C. E., and Soto-Morones, H. (2022). Prácticas de gestión de seguridad y salud en el trabajo: Una revisión sistemática de la literatura. *Ciencias Adm. Teoría Prax.* 18 (1), 89–104. doi:10.46443/catyp.v18i1.304

Muhammed, S., and Zaim, H. (2020). Peer knowledge sharing and organizational performance: the role of leadership support and knowledge management success. *J. Knowl. Manag.* 24 (10), 2455–2489. doi:10.1108/JKM-03-2020-0227

Mutlu, N. G., and Altuntas, S. (2019). Assessment of occupational risks in Turkish manufacturing systems with data-driven models. *J. Manuf. Syst.* 53, 169–182. doi:10.1016/j.jmsy.2019.09.008

Nuñez-Lira, L. A., Alfaro Bernedo, J. O., Aguado Lingan, A. M., and González Ponce de León, E. R. (2023). Toma de decisiones estratégicas en empresas: Innovación y competitividad. *Rev. Venez. Gerenc.* 28 (Especial 9), 628–641. doi:10.52080/rvgluz.28.e9.39

Obando-Montenegro, J. E., Sotolongo-Sanchez, M., Ii, E., Maria Villa-González, D., and Pino, I. I. (2019). artículo original ergonomía, seguridad y salud ocupacional Evaluación del desempeño de seguridad y salud en una empresa de impresión Safety and Health Performance Evaluation on a Printing manufacturer Company. Available online at: http://scielo.sld.cu/pdf/rii/v40n2/1815-5936-rii-40-02-136.pdf.

OIT (2020). Perspectivas sociales y del empleo en el mundo: Tendencias 2020. Ginebra: Organización Internacional del Trabajo. Available online at: https://www.ilo.org/global/research/global-reports/weso/2020/lang--es/index.htm.

Omran, M., Khallaf, A., Gleason, K., and Tahat, Y. (2021). Non-financial performance measures disclosure, quality strategy, and organizational financial performance: a mediating model. *Total Qual. Manag. Bus. Excell.* 32 (5–6), 652–675. doi:10.1080/14783363.2019.1625708

Oraee, M., Hosseini, M. R., Edwards, D. J., Li, H., Papadonikolaki, E., and Cao, D. (2019). Collaboration barriers in BIM-based construction networks: a conceptual model. *Int. J. Proj. Manag.* 37 (6), 839–854. doi:10.1016/j.ijproman.2019.05.004

Organización Internacional del Trabajo (2019). *Safety and health at the heart of the future of work: building on 100 years of experience*. Ginebra: OIT. Available online at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/documents/publication/wcms_686645.pdf.

Pujol-Cols, L., and Lazzaro-Salazar, M. (2021). Ten years of research on psychosocial risks, Health, and performance in Latin America: a comprehensive systematic review and research agenda. *Rev. Psicol. del Trab. las Organ.* 37 (3), 187–202. doi:10.5093/jwop2021a18

Ramos, G., Aguiar, A. P., and Pequito, S. (2022). An overview of structural systems theory. *Automatica* 140, 110229. doi:10.1016/j.automatica.2022.110229

Río-Cortina, J. L. D., Acosta-Mesa, R. E., Santis-Puche, M. A., and Machado-Licona, J. (2022). El efecto mediador de la innovación entre la gestión del talento humano y el desempeño organizacional. *Inf. tecnológica* 33 (2), 13–20. doi:10.4067/S0718-07642022000200013

Senge, P. M. (1990). *The fifth discipline: the art and practice of the learning organization*. New York, NY: Doubleday.

Sharma, M., and Kodali, R. (2008). Development of a framework for manufacturing excellence. *Meas. Bus. Excell.* 12 (4), 50–66. doi:10.1108/13683040810919962

Soria Reséndez, A. C., Pedraza Melo, N. A., and Bernal González, I. (2019). El clima organizacional y su asociación con la satisfacción laboral en una institución de educación superior. *Acta Univ.* 29, 1–14. doi:10.15174/au.2019.2205

Tashakkori, A., and Teddlie, C. (2010). *SAGE handbook of mixed methods in social and behavioral research*. 2nd edn. Thousand Oaks, CA: SAGE Publications. doi:10.4135/9781506335193

Ulises, O., Gustavo, R., and Ferney, D. (2019). Condiciones de Seguridad y Salud en el Trabajo, una revisión teórica desde la minería colombiana. Available online at: https://www.redalyc.org/journal/290/29058864013/29058864013.pdf.

Widyasmoro, A., Elnardy, M. C. , Supriyadi, and Zaharuddin (2025). The influence of safety briefing, knowledge, and awareness of occupational safety and health in realizing zero accidents in the work environment. *Int. J. Bus. Law, Educ.* 6 (1), 14–21. doi:10.56442/ijble.v6i1.973