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FROM HAZARD IDENTIFICATION TO TRAINING PLANNING – A DATA-DRIVEN APPROACH TO OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT IN A MANUFACTURING COMPANY

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Abstract:
The effectiveness of occupational safety and health (OSH) training depends not only on compliance with formal requirements, but also on alignment with actual workplace hazards and the needs of different employee groups. This study assessed whether employee survey data can support the identification of training needs and the prioritisation of OSH training in a manufacturing enterprise. The analysis was based on a predefined analytical sample of 100 employees and combined closed Likert-scale items with open-ended questions. Mean ratings were 3.78 for training usefulness, 3.77 for alignment with actual hazards, and 3.89 for the need for additional training. The technical/maintenance group reported the lowest training-alignment score (3.27) and a high need for additional training (4.09). Open responses highlighted machinery, work organisation, slips and trips, dust/noise, and a preference for short practical refresher activities. The findings were used to develop a transparent job-group training-planning matrix. The proposed approach supports data-informed prioritisation within the investigated enterprise and is intended to complement, not replace, occupational risk assessment and other formal OSH information.

Key words: hazard identification; manufacturing enterprise; occupational safety and health; OSH training; training needs

INTRODUCTION

Modern manufacturing enterprises operate under conditions of continuous technological and organisational change, affecting both production processes and the nature of workplace hazards. Occupational safety and health (OSH) should therefore be treated as a management area linked to employee health, process continuity and loss prevention, rather than as a domain limited to documentation and responses to identified nonconformities. The employer's fundamental duty to provide safe and hygienic working conditions arises from the Labour Code [1].

One of the basic tools for transferring knowledge about hazards is OSH training, including supplementary training activities. Regulations define the objectives and organisational framework of training, while requiring the employer to adapt its programme to the type and conditions of work performed [2] and to hazards arising from the work environment. General OSH regulations also require preventive measures to be linked to workstation organisation, technology, and hazardous or harmful factors [3]. The fact that training has been delivered therefore does not by itself demonstrate that its content is useful or sufficiently aligned with actual work.

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In practice, training programmes are often built around fixed schedules and formal requirements imposed by labour law. This approach facilitates organisation but may lead to repeated general content that does not address current workplace problems or hazards associated, for example, with machinery, equipment or the specific operating conditions of a plant. Council Directive 89/391/EEC, adopted within the European Economic Community (EEC), emphasises informing, consulting and training workers in relation to occupational risks [4]. The International Labour Organization (ILO) Guidelines on Occupational Safety and Health Management Systems (ILO-OSH 2001) treat employee competence and participation as elements of an OSH management system [5] that should reflect the specific nature of the work.

The requirements of ISO 45001, developed by the International Organization for Standardization (ISO), link hazard identification with competence and the assessment of effectiveness [6]. Training planning should therefore use not only formal documentation but also information from people performing the work. The aim of this article is to assess how data on reported hazards, training usefulness, training alignment and expected topics can support the setting of training priorities. In this study, the term "data-driven" denotes the use of structured empirical employee data, rather than automated prediction, to support training decisions through explicit rules. The originality of the approach lies in combining reported hazards, assessments of current training, declared training needs and job-group characteristics in one decision-support procedure. The resulting matrix is intended for the investigated enterprise and is not presented as a universal model for all manufacturing companies.

LITERATURE REVIEW

Hazard identification and training-needs assessment

Appropriate training planning should begin with identifying what may actually expose an employee to harm, both while performing work and while moving around the facility. Hazard identification should draw on documentation, workstation observations, inspection results, information on failures, employee comments [7], and conclusions from accidents and near misses occurring on the premises. Employees are not merely recipients of a completed assessment: they know the actual conditions in which tasks are performed and the non-routine situations that occur during work. An interactive approach to risk assessment therefore assumes employee participation in hazard identification [8] and subsequent improvement. An occupational health and safety management system should integrate the systematic planning, implementation, monitoring and continuous improvement of measures intended to protect employee health and safety [9, 10]. Its performance should not be assessed exclusively through retrospective outcomes such as accidents and injuries; leading indicators can complement such lagging indicators by providing information on preventive activities, management commitment, training, employee involvement and other conditions associated with OHS performance [11, 12, 13].

From the employee perspective, effective training should have a clearly defined objective, relate to the activities performed and support the transfer of knowledge into behaviour. For adult learners, practical examples and opportunities to practise responses to non-routine situations are particularly important, together with an understanding of how such situations should be reported and handled [14]. Training-needs assessment, in turn, enables formally required training to be distinguished from interventions required to address specific workplace performance or safety problems. Such assessment should consider occupational risks, existing competence, problems identified in work practice and the characteristics of the intended employee group [15, 16]. Without this diagnosis, the number of training sessions may increase without a proportionate improvement in safety or employee engagement.

Training effectiveness and safety culture

Changing employee behaviour cannot rely solely on reiterating prohibitions or penalising non-compliance. Behavioural methods for improving safety include work observation, feedback and reinforcement of safe behaviour [17], supported by dialogue between management and employees. Communication

should also be adapted to the audience and grounded in problems that employees recognise from their daily work [18]. Analysis of accidents and near misses should lead to technical, organisational or educational measures appropriate to the identified causes and aimed at reducing risk [19].
Accident models indicate that an event usually results from a combination of technical, organisational and human factors rather than from a single employee error caused, for example, by insufficient knowledge or non-compliance with internal requirements [20]. Time pressure, communication, established habits and tolerance of deviations from rules may also be relevant and require a response from direct supervisors and other organisational stakeholders [21]. Safety culture influences whether safety rules are treated as part of normal work or merely as an external obligation arising from legal, internal or supervisory requirements [22]. It can be developed through management, effective communication, training and employee participation [23]. Management staff have a particular role because they influence the pace and organisation of work and the way reports of nonconformities are handled [24].
Employees need not only knowledge but also confidence that safe work is supported by the organisation at every level [25]. A mature management system should anticipate change and learn from both failures and successful actions [26, 27]. In some areas, general training cannot replace specialist competence delivered by appropriately qualified persons. Service work involving hazardous energy is an example: a Lockout-Tagout (LOTO) system requires practical instruction and periodic verification of competence [28].

Employee participation and use of data

Employee surveys are used in the workplace to identify knowledge, awareness and areas requiring improvement or additional attention to hazards [29]. Ulewicz and Lazar [30] also used employee opinions to assess the influence of selected Lean tools on safety in manufacturing organisations. Their findings showed a reduction in potentially hazardous events with longer use of the tools, while 5S and Total Productive Maintenance (TPM) were rated as particularly important for safety. These findings indicate that employee-reported information can complement event data and support the assessment of OSH activities [30]. A similar survey-based approach has been used to assess management-staff awareness of management systems [31]. Employee participation may include reporting hazards, taking part in risk assessment and consulting proposed OSH solutions [32], and the scope of such participation can be measured [33]. Relationships between safety training, employee participation and safety performance have also been reported in manufacturing settings [34].
Evaluation of training should not be limited to attendance or a short knowledge test. A review prepared by the U.S. National Institute for Occupational Safety and Health (NIOSH) points to the need to assess changes in knowledge, employee behaviour, working conditions and organisational outcomes [35]. A report by the UK Institution of Occupational Safety and Health (IOSH) similarly emphasises that training should arise from organisational needs and remain part of everyday management rather than being treated solely as a formal requirement [36]. Survey data are therefore useful not as stand-alone evidence of system effectiveness, but as a diagnostic source indicating where further analysis and development may be required.

RESEARCH METHODOLOGY

The study was conducted in July 2026 in a manufacturing enterprise employing approximately 300 people. All employees were invited to participate. The questionnaire was distributed electronically via Google Forms and in paper form. A total of 122 questionnaires were returned (approximate response rate 40.7%), of which 112 met the completeness criterion (approximately 37.3% of the workforce). The analytical sample size was set at 100 complete questionnaires before statistical analysis began. Analysis was initiated when the 100th complete questionnaire had been received, corresponding to 33.3% of the workforce. The target of 100 complete questionnaires was adopted pragmatically before analysis because it corresponded to approximately one-third of the approximately 300-person workforce and was

considered sufficient for the planned diagnostic, primarily descriptive analysis; it was not derived from a formal a priori power calculation. Data collection remained open, and 12 additional complete questionnaires were received later; in accordance with the previously adopted analytical cut-off, they were not added to the analytical dataset. Open-ended questions were optional; 79 respondents answered the question on the most important hazards and 73 answered the question on missing training topics. The analytical sample included employees from production, warehouse/logistics, technical/maintenance, administration/office, and managerial/supervisory positions. The research procedure is presented in Table 1.

Table 1

Research procedure used in the study

Stage	Data scope	Relevance to training planning
1	Hazards reported by employees	Identification of topics requiring attention
2	Assessment of usefulness and alignment of current training	Identification of well-rated areas and potential gaps
3	Declared need for additional training	Identification of demand for supplementary activities
4	Thematic categorisation of open-ended responses	Linking training topics to employees' language and experience
5	Segmentation by job group	Differentiation of priorities across employee groups

The questionnaire included demographic items, closed-ended statements rated on a five-point Likert scale, open-ended questions and additional Yes/No questions.

Likert anchors were: 1 – strongly disagree, 2 – rather disagree, 3 – neither agree nor disagree, 4 – rather agree, and 5 – strongly agree. A questionnaire was considered complete when demographic items, the analysed Likert items and the closed Yes/No items were completed; open-ended questions were optional. Responses 4-5 were classified as positive, 3 as neutral and 1-2 as negative; Yes/No items were summarised as percentages. Means and sample standard deviations were calculated. Because Likert responses are ordinal and job-group sizes were unequal, between-group comparisons for training usefulness, training alignment and the need for additional training were additionally assessed using the Kruskal-Wallis test. Given the very small managerial/supervisory subgroup, inferential group comparisons were treated as exploratory and no pairwise causal or population-level claims were made.

The questionnaire was developed by the first author on the basis of the literature, applicable OSH regulations and professional OSH experience, including routine workplace observations carried out as part of OSH duties in the enterprise. No separate observational pre-study was conducted specifically to construct the questionnaire; however, its content was adapted to the tasks and hazards present at the investigated workstations while retaining a common core of questions for all respondents. The instrument was designed as a diagnostic questionnaire rather than a one-dimensional psychometric scale; therefore, a single Cronbach's alpha coefficient for the entire instrument was not considered methodologically appropriate. No separate pilot survey was used for psychometric validation. Participation was voluntary and anonymous. The introductory information explained the scientific purpose of the survey and the anonymous use of the data; neither the electronic nor the paper version collected names, e-mail addresses or other direct identifiers. The study was non-interventional. The closed-ended items directly analysed in this paper are reproduced in Tables 3 and 7; the full questionnaire is available from the corresponding author on request. The wording and scope of the questionnaire were reviewed with the academic supervisor before data collection. No formal ethics committee approval or exemption was sought. In view of the anonymous, voluntary and non-interventional character of the survey, and the absence of direct identifiers or questions collecting medical diagnoses or other clinical data, the study was treated as a minimal-risk employee survey.

Open-ended responses were thematically coded by the first author. The coding framework and category interpretation were discussed and agreed with the academic supervisor, while the first author

performed the coding of individual responses. Recurrent content was grouped into categories describing hazards or training needs. One response could receive more than one code when it contained several themes. Because coding was performed by one researcher, no inter-coder agreement coefficient was calculated. Representative anonymised examples included references to “moving parts of machines, noise and dust, and risk during cleaning” (machinery/equipment and dust/noise), “hazardous energies during repairs, work at height and hot work” (hazardous energy/repairs), and “workstation ergonomics, eye strain and stress” (ergonomics/workload).

The work context covered machinery-intensive production, internal transport and load handling, technical/maintenance interventions involving energy isolation and non-routine tasks, office work, and managerial/supervisory responsibilities. Objective OSH outcome data such as annual accident rates, near-miss trends, inspection results and detailed occupational risk-assessment records were not included in the statistical dataset analysed in this paper. Consequently, the survey results are not used to claim training effectiveness or causal effects on safety outcomes. The absence of such objective measures is treated as a study limitation.

RESEARCH RESULTS

Characteristics of respondents

The analytical sample comprised 100 employees, and the demographic section was complete for every questionnaire included in the analysis. Men accounted for 62% of the sample, women for 36%, and 2% selected “prefer not to say”. The largest age groups were 36-45 and 46-55 years. Production employees formed the largest job group, which reflects the operational profile of the investigated enterprise. Sample characteristics are presented in Table 2.

Table 2

Characteristics of the research sample

Characteristic	Categories/values	Number	Share
Number of employees in the enterprise	approximately 300 people	–	–
Respondents included in the analysis	first 100 complete questionnaires	100	33.3% of the workforce
Sex	male; female; prefer not to say	62; 36; 2	62%; 36%; 2%
Age	up to 25 years; 26-35 years; 36-45 years; 46-55 years; over 55 years	6; 21; 33; 28; 12	6%; 21%; 33%; 28%; 12%
Length of service	under 1 year; 1-3 years; 4-7 years; 8-15 years; over 15 years	9; 12; 30; 27; 22	9%; 12%; 30%; 27%; 22%
Job group	production; administration/office; warehouse/logistics; technical/maintenance; managerial/supervisory	55; 18; 13; 11; 3	55%; 18%; 13%; 11%; 3%
Location	rural area; urban area	56; 44	56%; 44%

Assessment of hazard awareness and OSH training

Respondents generally rated their awareness of hazards and their ability to respond to emergencies or accidents positively. OSH instructions and safety rules were also generally assessed as understandable. The mean score for the need for additional training was 3.89, compared with 3.78 for training usefulness and 3.77 for alignment with actual hazards. The results, including dispersion, are presented in Table 3. These findings indicate a demand for further development of training rather than an unequivocally negative assessment of the existing training system.

Table 3

Selected results on hazard awareness and OSH training

Statement	Mean (SD)	Positive	Neutral	Negative
Working conditions at my workstation are safe	3.85 (0.70)	69%	30%	1%
The level of occupational safety in the enterprise is high	3.76 (0.57)	71%	28%	1%
Situations that may lead to an accident or harm to health occur at my workplace	2.60 (0.62)	4%	55%	41%
I know the main hazards at my workstation	4.12 (0.56)	92%	7%	1%
I know how to act in the event of a hazard or accident	4.19 (0.60)	90%	10%	0%
Safety instructions and rules are understandable	3.90 (0.54)	82%	17%	1%
OSH training has been useful for my work	3.78 (0.61)	74%	23%	3%
The scope of OSH training reflects actual hazards at my workstation	3.77 (0.55)	73%	26%	1%
Additional training in safe work practices is needed	3.89 (0.67)	76%	22%	2%

Assessment of training by employee group

Group-level results were interpreted cautiously because subgroup sizes were unequal and the managerial/supervisory group comprised only three respondents. Descriptively, the technical/maintenance group reported the lowest training-alignment score (3.27) and a high need for additional training (4.09), while the administration/office group reported the lowest usefulness score (3.44). The Kruskal-Wallis test indicated overall between-group differences in training usefulness ($H(4) = 10.23$, $p = 0.037$) and training alignment ($H(4) = 12.90$, $p = 0.012$), whereas the difference in declared need for additional training was not statistically significant ($H(4) = 2.91$, $p = 0.573$). Because of the small and unequal subgroups, these omnibus results are treated as exploratory; no claim is made that a specific pair of job groups differs in the underlying workforce.

Table 4

OSH training assessment by employee group

Job group	Usefulness Mean (SD)	Alignment Mean (SD)	Need for additional training Mean (SD)
Production (n = 55)	3.87 (0.58)	3.85 (0.52)	3.80 (0.62)
Warehouse/logistics (n = 13)	3.77 (0.83)	3.77 (0.60)	3.92 (0.64)
Technical/maintenance (n = 11)	3.82 (0.40)	3.27 (0.47)	4.09 (0.54)
Administration/office (n = 18)	3.44 (0.62)	3.78 (0.55)	4.00 (0.91)
Managerial/supervisory (n = 3)	4.00 (0.00)	4.00 (0.00)	4.00 (0.00)

Hazards identified by employees

Open-ended responses identified hazards and safety problems observed in everyday work. Seventy-nine respondents answered this question. The most frequently reported categories concerned machinery and equipment, work organisation, haste and routine, followed by slips and trips, the condition of walkways, and dust exposure and noise. The results are presented in Table 5.

Table 5

Categories of hazards and safety problems identified by employees

Hazard/safety-problem category	Number of indications
Machinery and equipment/moving parts	29
Work organisation, haste, routine and deviations from rules	24
Slips, trips, floors, walkways and housekeeping	19
Dust exposure, noise and work-environment conditions	18
Ergonomics and physical/ mental workload	13
Internal transport, vehicles, pedestrian traffic and loads	10
Failures, repairs, hazardous energy and particularly hazardous work	9
Communication, signage and information flow	4

One response could be assigned to more than one category, so the number of category indications exceeds the number of respondents. The responses therefore capture both technical hazards and organisational conditions influencing safe work.

Declared training needs

The question on missing training topics was answered by 73 respondents. The most frequently reported needs concerned short periodic refresher training and practical activities, exercises and demonstrations. Other responses referred to safe machine operation and cleaning, responses to failures and non-routine situations, energy isolation, first aid, ergonomics, communication and internal transport. The categories are presented in Table 6.

Table 6

Categories of declared training needs

Training-need category	Number of indications
Short and periodic refresher training	28
Practical training, exercises and demonstrations	27
Operation, cleaning and securing of machinery	22
Response to failures and non-routine situations	14
Energy isolation and service work (LOTO)	13
First aid and emergency response	10
Ergonomics and reduction of physical workload	10
Communication, hazard reporting and incident analysis	8
Internal transport, pedestrian traffic and storage	7
Dust, noise and personal protective equipment	4

One response could be assigned to multiple categories, so the numbers do not add up to the number of respondents. The findings therefore concern both training content and the preferred form and frequency of knowledge transfer.

Additional closed questions

The additional closed questions provided contextual information on prevention and employee perceptions. Seventy-six percent of respondents stated that more training and preventive measures would increase their sense of safety, and 45% reported having witnessed a near miss during the previous 12 months. Seventy-seven percent stated that reported hazards resulted in corrective action. Seventy-nine percent associated the level of occupational safety with work motivation, while 83% stated that improving the OSH system would improve their assessment of the enterprise as an employer. These are self-reported perceptions and are not interpreted as evidence of causal effects. The results are presented in Table 7.

Table 7
Results of additional closed questions

Question	Yes	No
Witnessed a near miss in the last 12 months	45%	55%
Reported hazards resulted in corrective action	77%	23%
More training and preventive measures increase the sense of safety	76%	24%
The level of occupational safety influences work motivation	79%	21%
Improving the OSH system would improve the assessment of the enterprise as an employer	83%	17%

Training-planning matrix

Based on the survey results, a descriptive OSH training-planning matrix was developed to organise information by job group without assigning an artificial numerical priority score. Training areas were identified by combining three directly observed sources of survey information: job-group assessments of training alignment and the need for additional training, reported hazards, and training needs identified in the open-ended responses. The job-group results presented in Table 4 were used to characterise training alignment and declared need for additional training, while the hazard and training-need categories from the open-ended responses were used to describe the content requiring attention. Because subgroup sizes were small and unequal, the matrix is intended to support interpretation and training planning rather than to provide a validated ranking of employee groups. The resulting matrix is presented in Table 8.

Table 8
OSH training-planning matrix based on employee survey data

Job group	Main hazards/problems	Declared training needs	Results relevant to planning
Production	Machinery, equipment cleaning, dust, noise, slips, routine	Machine operation and cleaning; short practical training; response to failures	Training alignment: 3.85; additional training need: 3.80
Warehouse/logistics	Internal transport, vehicles, pedestrians, loads, routes and walkways	Pedestrian and forklift traffic; securing loads; transport organisation	Training alignment: 3.77; additional training need: 3.92
Technical/maintenance	Failures, hazardous energy, service work, non-routine tasks	LOTO; energy isolation; particularly hazardous work; event analysis	Training alignment: 3.27; additional training need: 4.09
Administration/office	Ergonomics, evacuation, communication, incident response	Workstation ergonomics; first aid; emergency procedures	Training alignment: 3.78; additional training need: 4.00
Managerial/supervisory	Work organisation, supervision, enforcement, communication, analysis of reports	OSH communication; response to reports; analysis of incident causes	Training alignment: 4.00; additional training need: 4.00

DISCUSSION

The findings indicate that an employee survey can provide useful diagnostic information for OSH training planning. Documentation, occupational risk assessment and inspection results provide a formal and technical view of the workplace, whereas employee responses highlight routine, haste, communication difficulties and non-routine situations encountered during work and while moving around the facility. Open-ended responses are particularly useful because they describe hazards in the language of the people performing the work. The survey therefore complements formal sources of information rather than replacing them.

Not every reported hazard should result in a separate training intervention. Where a problem arises from poor machine condition, damaged flooring, inadequate transport organisation or another technical or organisational cause, the primary response should address the source of the hazard. Training can explain safe procedures and strengthen competence, but it cannot replace technical controls, appropriate work organisation, verification or effective supervision. Treating training as the default response to every technical problem could shift responsibility for system deficiencies onto employees.

Respondents primarily indicated a need for short activities linked to specific work tasks. In practice, these may include thematic briefings, incident discussions, demonstrations of safe machine operation or emergency-response exercises. The technical/maintenance group warrants particular attention because it reported the lowest mean training-alignment rating (3.27) and a high declared need for additional training (4.09), while its hazard profile includes hazardous energy and non-routine technical work. This interpretation is specific to the investigated enterprise and should not be treated as a general ranking of employee groups.

The training-planning matrix should not be applied mechanically. In practice, survey findings should be combined with occupational risk assessments, inspection results, event records, failure and nonconformity records, and accident and near-miss analyses. These objective records were not statistically linked to the survey data in the present study. Accordingly, the findings describe perceived hazards, assessments of training and declared needs rather than objective training effectiveness or causal safety outcomes. The study was cross-sectional, self-reported and conducted in one enterprise; voluntary participation may have introduced self-selection and non-response bias. The analytical cut-off at N = 100, although established before analysis began, also means that 12 later complete questionnaires fell outside the analytical dataset, so a temporal selection effect cannot be completely excluded. Small subgroup sizes, especially managerial/supervisory (n = 3) and technical/maintenance (n = 11), further limit group-level inference.

CONCLUSIONS

The findings indicate that data collected directly from employees can support the planning of OSH training within an enterprise. Their value lies in supplementing information derived from documentation, occupational risk assessment, workplace inspections and analyses of accidents and near misses. Employees directly involved in work processes can also identify issues related to daily work organisation, haste, routine, communication and non-routine situations that may not be fully visible in formal documentation. The present survey should therefore be interpreted as a diagnostic source of employee perceptions rather than as evidence of training effectiveness.

The results do not indicate an unequivocally negative assessment of the existing OSH training. Most respondents positively rated their knowledge of hazards, ability to respond to hazardous situations, clarity of instructions and usefulness of the training content. At the same time, the mean need for additional training (3.89) suggests scope for further development, particularly where working conditions, equipment, processes or tasks change. This coexistence of positive training assessments and demand for additional training is consistent with a need for more frequent, practical and task-specific reinforcement rather than with a conclusion that the existing system is ineffective.

Observed differences between job groups suggest that a uniform training scope may not fully reflect the specific work performed in production, warehousing, maintenance, administration and managerial roles. These differences should be interpreted cautiously because some subgroups were small. In the investigated enterprise, the technical/maintenance group warrants particular attention because its work includes failures, repairs, hazardous energy, non-routine interventions and particularly hazardous tasks. Open-ended responses also suggest that employee expectations concern not only topic selection but also the method of knowledge transfer: short, periodic and practical activities linked to actual tasks and events were frequently requested.

A practical contribution of the study is the OSH training-planning matrix, which organises information on job groups, hazards and declared needs and presents selected survey indicators in a descriptive form without assigning an artificial numerical ranking to job groups. Its purpose is not to replace mandatory training programmes or occupational risk assessment, but to support decisions on the scope and sequence of supplementary activities. The matrix should be used together with formal OSH information, including inspection findings, incident and failure records, and conclusions from accident and near-miss analyses whenever such data are available for decision-making.

The findings also indicate that training should not be treated as a universal response to every reported hazard. If a problem results from machine condition, infrastructure damage, transport organisation or another technical or organisational cause, the primary measure should address the source of the non-conformity. Training can support safe work practices, but it cannot replace modernisation, proper organisation, effective supervision or timely responses to employee reports.

The survey further indicates that employees associate occupational safety with work motivation and with their assessment of the enterprise as an employer. Because the study is cross-sectional and self-reported, these associations should not be interpreted as causal effects. Nevertheless, incorporating employee feedback into OSH planning may support participation and safety culture when reported issues are analysed and followed by appropriate action.

The main limitations are the single-enterprise setting, the cross-sectional self-report design, voluntary participation, unequal and small subgroups, the chronological analytical cut-off, and the lack of objective outcome measures such as accident rates, near-miss trends or observed behaviour in the statistical analysis. The results should therefore be interpreted primarily in relation to the investigated enterprise and should not be automatically generalised to manufacturing companies as a whole.

In summary, an employee survey can serve as an additional source of data for moving from training planning based mainly on fixed schedules towards an approach that also considers reported hazards, job-group characteristics and employee needs. Its greatest value lies in combination with formal OSH information rather than in use as a stand-alone decision source. The descriptive matrix makes the logic of training planning explicit by showing how job-group assessments, reported hazards and declared training needs are considered together, without assigning an artificial ranking to employee groups.

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