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Proactive Indicators in Relation to Safety Factors

Factor	Indicator
OHS management	
Objectives aligned with strategy	Number of measurable OSH improvement goals established in the enterprise (Podgórski 2015)
	Safety goals are defined both for short and long term (Reiman and Pietikäinen 2010)
	Safety goals are relevant for the organization (Reiman and Pietikäinen 2010)
Action plan	There is an action program for reaching the safety goals (Reiman and Pietikäinen 2010)
Sufficient resource allocation	Costs assigned to HSE for preventing accidents (per each worker per year, and with respect to total expense) (Amir-Heidari et al. 2017)
	The availability of sufficient workforce is ensured (Reiman and Pietikäinen 2010)
	Tools and instruments are appropriate and up to date (Reiman and Pietikäinen 2010)
	Human performance issues such as fatigue and communication are taken into account in work schedule planning (Reiman and Pietikäinen 2010)
Monitoring	Percentage of completion of activities related to risk assessment and control in the planned times (Amir-Heidari et al. 2017)
	Number of leading vs. lagging performance indicators monitored to measure OSH management performance (Podgórski 2015)
	% of definitions of leading and lagging performance indicators subject to periodical review and update (Podgórski 2015)
Performance discussion	Positive feedback is given on safety conscious behavior of the personnel (Reiman and Pietikäinen 2010)
Rewarding and sanctions	The no. of rewards given to workers for OHS hazard reports (Mohammadfam et al. 2017)
	The no. of rewards for participating in OHS activities (Mohammadfam et al. 2017)
	Are workers given recognition for excellent SHW performance (ISSA 2020)
	The no. of OHS violations, & no. of sanctions (Mohammadfam et al. 2017)
OHS leadership	
Management's example	How often management walks on the floor (OHS best practices 2015)
	Percent of jobsite toolbox meetings attended by jobsite supervisors/managers (Hinze et al. 2013)
	Percent of jobsite pre-task planning meetings attended by job-site supervisors/managers (Hinze et al. 2013)
	Management is actively committed to, and visibly involved in, safety activities (Reiman and Pietikäinen 2010)
Communication	Rating of the effectiveness of OSH communication via workforce survey (Podgórski 2015)
	How often safety is discussed at meetings (OHS best practices 2015)
	How many different avenues the organization uses to communicate OHS messaging (OHS best practices 2015)
	There are both formal and informal communication channels for raising safety concerns in the organization – up to the highest level if necessary (Reiman and Pietikäinen 2010)
	The bottlenecks of information flow have been identified and controlled (Reiman and Pietikäinen 2010)

	Information flow in change of shifts situations is assured (Reiman and Pietikäinen 2010)
Transparency	Reporting of deviations, worries and own mistakes is encouraged by the management (Reiman and Pietikäinen 2010)
	The personnel are informed about the overall safety level and current challenges on a regular basis (Reiman and Pietikäinen 2010)
	The extent to which the decision making in the organization utilizes all the necessary competence and is transparent in its content and progress (Reiman and Pietikäinen 2010)
Developing awareness and knowledge	% of workers declaring good knowledge of OSH policy of the enterprise (Podgórski 2015)
	Are reported unplanned SHW events followed-up by leaders for investigation, SHW learning/improvement, and feedback to those directly involved (ISSA 2020)
Empowerment	Variety of views and opinions are encouraged, and decisions are based on expertise not formal position (Reiman and Pietikäinen 2010)
	Are worker suggestions for improving SHW followed-up adequately (ISSA 2020)
	The know-how of the “shop-floor” personnel is utilized in creating and revising of rules and instructions (Reiman and Pietikäinen 2010)
Structure	
Clear roles and responsibilities (Line organization responsible) (H&S organization) supporting line	Percentage of work posts with defined OSH responsibilities and duties (Podgórski 2015)
	% of workers declaring awareness of their duties and responsibilities with regard to OSH MS (Podgórski 2015)
	The clarity of the organizational structure including the extent to which roles and responsibilities have been clearly and unambiguously described (Reiman and Pietikäinen 2010)
Practical structures	No indicators found.
Processes	
Internal rules	Number of OSH policy reviews and updates carried out by top management (Podgórski 2015)
Risk assessment	% of workstations with risk assessment documented and risk control measures planned to be implemented (Podgórski 2015)
	% of risk assessment processes completed and documented (in relation to established plans) (Podgórski 2015)
	% of workstations with risk levels assessed as medium to high (requiring planning of risk control measures) (Podgórski 2015)
	The no. of risk assessments carried out in units (Mohammadfam et al. 2017)
	Are SHW risk reduction measures evaluated (ISSA 2020)
	Number or percent of management personnel and field employees with 10-h (or 30-h) OSHA certification cards (Hinze et al. 2013)
Induction and training	Percentage of workers participating in OSH refresher courses (Podgórski 2015)
	% of right answers per persons from tests to evaluate the effectiveness of OSH training (Podgórski 2015)
	Feedback is gathered from the trainees and it is utilized in developing the training program (Reiman and Pietikäinen 2010)
	Percentage of OSH training courses reviewed and improved for their quality and effectiveness (Podgórski 2015)
	Are SHW an integrated part of induction processes (ISSA 2020)
	Are SHW covered in initial training (ISSA 2020)
	Are SHW covered in refresher training (ISSA 2020)
	What per cent of the workforce has OHS training beyond basic legislated compliance (OHS best practices 2015)
	Competence is maintained for both new and old technology (Reiman and Pietikäinen 2010)
	Simulators and simulated operations are utilized in training (Reiman and Pietikäinen 2010)
	Operating events (own plant as well as outside) are utilized as training material (Reiman and Pietikäinen 2010)
	There is regular training on emergencies on-site (Reiman and Pietikäinen 2010)
Reporting	There is a comprehensive system for reporting incidents and other learning experiences such as near misses (Reiman and Pietikäinen 2010)

	The no. of units that have an OHS reporting system (Mohammadfam et al. 2017)
	The no. of OHS performance reports from units (Mohammadfam et al. 2017)
Information systems	There is a system for documenting history data on equipment and their maintenance actions (Reiman and Pietikäinen 2010)
	The no. of units in which OHS report & record-keeping systems exist (Mohammadfam et al. 2017)
	Assessment of technological solutions, available on market, for increasing efficiency of safety system (Janackovic et al. 2020)
Documentation	History data is used in analysis of reliability and maintenance needs of the equipment (Reiman and Pietikäinen 2010)
	The quality of documentation and procedures (Reiman and Pietikäinen 2010)
Development	There is a procedure to ensure that key safety issues are addressed in the design and engineering phase of the plant and its components (Reiman and Pietikäinen 2010)
	Are technological or organizational innovation used to reduce SHW hazards and risks in the design stage (ISSA 2020)
	There is a procedure to maintain and update the plant design basis documentation (Reiman and Pietikäinen 2010)
	Number of analyses of impact on OSH carried out with regard to changes in OSH regulations, technologies and knowledge (Podgórski 2015)
	Are targeted programmes and their SHW improvement goals evaluated (ISSA 2020)
Supplier management	Number of contractors assessed for their compliance with OSH management requirements (Podgórski 2015)
	Number or percent of subcontractors selected, in part, on the basis of satisfying specific safety criterion prior to being awarded the subcontract (Hinze et al. 2013)
	Requirement that each subcontractor submit a site-specific safety program that must be approved prior to the performance of any work by that subcontractor (Hinze et al. 2013)
	Contractors have possibilities for expressing safety worries and providing safety proposals on issues they notice (Reiman and Pietikäinen 2010)
	Vendor exit debrief: Percent of exit interviews that include identified hazards, unsafe behaviors or incidents (Hallowell et al. 2013)
	Vendor safety audits: The percentage of vendors in compliance with site policies and procedures (Hallowell et al. 2013)
	Is the promotion of SHW included in procurement processes (ISSA 2020)
Culture	
Safety as a core business value	Safety is a clearly recognized value at the organization (Reiman and Pietikäinen 2010)
Fairness	Superior provides fair treatment of subordinates, understanding that errors are natural, but not all violations can be tolerated (Reiman and Pietikäinen 2010)
Commitment	Management is actively committed to, and visibly involved in, safety activities (Reiman and Pietikäinen 2010)
	Do leaders visibly demonstrate their commitment to SHW in their work processes and behaviour? (ISSA 2020)
	Are new leaders selected based on their intrinsic motivation for or proven record in SHW (ISSA 2020)
	Owners show commitment to safety activities (Reiman and Pietikäinen 2010)
Safety as a part of everyday work	The percentage of pretask plans prepared for work tasks (Hallowell et al. 2013)
	Is the organization systematically considering SHW when planning and organizing work (ISSA 2020)
	Are SHW an integrated part of discussions in pre-work meetings (ISSA 2020)
Safety in thinking	Attitude Survey, questionnaire (In Swuste et al. 2016 (Eindhoven TU in the Netherlands))
Individual behavior	
Safety awareness	The extent to which the personnel understands the hazards that are connected to their work (Reiman and Pietikäinen 2010)
	The extent to which the personnel understand the safety significance of their own tasks (Reiman and Pietikäinen 2010)
Compliance	Whether hazard assessments are actually being completed and workers are involved in the in the process (OHS best practices 2015)
	Percent of safety compliance on jobsite safety audits (inspections) (Hinze et al. 2013)

Self-management	The extent to which the personnel have a willingness to spend personal effort on safety issues and take responsibility for their actions. (Reiman and Pietikäinen 2010)
	The extent to which the personnel have a sense of personal ownership for an equipment, an area of plant or the entire operations of the plant. (Reiman and Pietikäinen 2010)
Understanding safety reasoning	The extent to which the personnel have basic knowledge of human performance issues (Reiman and Pietikäinen 2012)
	The extent to which the defense-in-depth principle is understood among the personnel (Reiman and Pietikäinen 2012)
Deciding to act safe in pressure and haste	There is a system for ensuring that time pressure does not compromise quality in safety-critical tasks (Reiman and Pietikäinen 2010)
	The extent to which the personnel prioritize safety over production in conflict situations or under time pressure (Reiman and Pietikäinen 2010)
Participating	Personnel participate in setting safety goals (Reiman and Pietikäinen 2010)
	Number of suggestions for safety improvements (Swuste et al. 2016)
	Rating of effectiveness of workers' participation in OSH management via workforce survey (Podgórski 2015)
	The no. of accident investigations carried out with worker participation (Mohammadfam et al. 2017)
Caring	The extent to which the personnel at all levels exhibit a questioning attitude (Reiman and Pietikäinen 2010)
	The extent to which the personnel remain humble toward their knowledge of the hazards and their competence (Reiman and Pietikäinen 2010)
Performance	
Quality	Defective product rate: negative deviation from estimated defect product rate (i.e., high figure stands for low defect rates and therefore high quality) (Köper et al. 2009)
	Rework: absolute figures per cost centre (Köper et al. 2009)
Productivity	Productivity figure: negative deviation from target productivity (i.e., a low figure stands for high productivity) (Köper et al. 2009)
	Asset efficiency: negative deviation from target (i.e., a low figure stands for high productivity) (Köper et al. 2009)
Reputation	Degree of satisfaction on a 5-point Likert scale (Fernández-Muñiz et al. 2009)
Social sustainability	Superior monitors the personnel's coping skills, stress and fatigue levels as well as technical skills (Reiman and Pietikäinen 2010)
Cost management	Analysis of costs of occupational injuries (Janackovic et al. 2020)
Stakeholder satisfaction	Degree of customer satisfaction on a 5-point Likert scale (Fernández-Muñiz et al. 2009)

Tampere University

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