Health and safety

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Core ideas

Workplace accidents can be linked to human error, system design or a combination of both.

Human errors include omissions, commissions, sequencing errors and timing errors, each describing a different way an action can go wrong.

Operator-machine systems can create accidents when controls or displays are confusing, poorly placed or easy to misread.

A token economy reduces accidents by rewarding safe behaviour, such as accident-free work, useful safety suggestions or actions that prevent harm.

Fox et al.'s mining study showed that a well-managed token economy can reduce lost-time injuries and days lost from work.

Swat's monitoring study shows why organisations should record accidents, minor injuries and risk events instead of waiting for major accidents to happen.

Key terms

Human error: A mistake by a worker that contributes to an accident or near miss.

Error of omission: Failing to do a required action.

Error of commission: Doing the wrong action or carrying out an action incorrectly.

Sequencing error: Doing the right actions in the wrong order.

Timing error: Doing an action too early, too late or for the wrong length of time.

Operator-machine system: The interaction between a worker, a machine, its controls and its displays.

Token economy: A reward system where tokens are earned for desired behaviour and exchanged for rewards.

Risk event: A minor incident or warning sign that reveals a possible accident risk.

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Further detail and evidence

Key study: Swat (1997) sought a practical risk-event recording system to identify causes and prevent accidents, rather than waiting for major injuries.

The initial stage of a three-year project examined four Polish plants: foundry, machinery, meat processing and furniture, employing 2,964 workers.

Records of 83 accidents from 1993 were analysed for frequency, severity and direct/indirect causes. Additional monitoring examined minor meat-processing-plant injuries in 1994.

At least 45.8% of accidents involved breaches of basic housekeeping principles; the additional study indicated that 95% of incidents went unreported.

Recommendations were to classify accident circumstances/types, record minor/first-aid injuries and include housekeeping in safety monitoring.

Repeated small incidents and poor housekeeping can reveal problems before serious accidents occur.

Human errors: omission leaves out an action; commission performs an incorrect action; sequencing performs correct steps in the wrong order; timing performs an action too early/late. Classification depends on the intended procedure and context.

System errors involve operator-machine design: confusing controls, incompatible mappings, poor labels, hard-to-read displays and inadequate feedback can invite mistakes. A display communicates information; a control changes the system. Training is useful but does not excuse a preventable design hazard.

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Continued

Fox et al. (1987) used exchangeable trading-stamp tokens for safety-related outcomes and preventative actions in mines, with reductions in injuries/lost time and costs sustained over years. Rewarding low incident numbers requires safeguards against concealment.

Swat recorded accidents and additional minor/risk events in four industrial plants. The study identifies housekeeping/procedure problems and major underreporting. Monitoring reveals hazards and patterns; an observational record does not establish that monitoring itself caused fewer accidents.

Applying the ideas

Failing to check a guard is omission; selecting the wrong switch is commission; starting a machine before securing the guard is a sequence error; responding too late to an alarm is timing. Similar switches can make an apparent personal error partly a system-design problem.

Evaluation and connections

Industrial records support application, but underreporting threatens validity and plants differ in risk. This was not experimental proof that a monitoring system reduced accidents.

Evaluate objective/subjective evidence, longitudinal methods, situational explanations and generalisations from findings.

Near-miss reporting can identify risks before severe harm. Consistent definitions and accessible confidential reporting improve data quality. Official accident numbers may look objective while missing unreported events. Compare exposure-adjusted patterns and workplace differences rather than blaming one worker from a raw count.