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SYSTEMATIC HAZARD IDENTIFICATION AND RISK EVALUATION USING OHS TECHNIQUES IN MANUFACTURING SECTOR

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Abstract

Manufacturing industries are inherently associated with a wide range of occupational hazards that pose risks to worker safety, health, and productivity. This study focuses on the systematic identification of hazards and evaluation of risks using Occupational Health and Safety (OHS) techniques in the manufacturing sector. Various tools such as Hazard Identification and Risk Assessment (HIRA), Job Safety Analysis (JSA), Failure Mode and Effects Analysis (FMEA), and Hazard and Operability Study (HAZOP) are applied to analyze workplace risks. The study highlights common industrial hazards, evaluates their severity and probability, and proposes appropriate control measures. The findings indicate that systematic risk assessment significantly reduces workplace accidents and enhances operational efficiency. The study recommends the integration of structured OHS frameworks into manufacturing practices for improved safety management.

Keywords: Hazard Identification, Risk Assessment, Manufacturing Industry, OHS, HIRA, FMEA, HAZOP, Workplace Safety

Introduction

The manufacturing sector plays a crucial role in economic development but is also one of the most hazardous work environments. Workers are exposed to mechanical, chemical, electrical, ergonomic, and environmental hazards. Ineffective safety practices often lead to accidents, injuries, and financial losses.

Occupational Health and Safety (OHS) aims to identify, evaluate, and control workplace hazards to ensure a safe working environment. Systematic hazard identification and risk evaluation are essential components of OHS management systems. This research focuses on applying structured OHS techniques to identify hazards and assess risks in manufacturing settings.

Objectives of the Study

- To identify various types of hazards present in manufacturing industries
- To evaluate risks using standardized OHS techniques
- To analyze the effectiveness of different risk assessment tools
- To suggest suitable control and mitigation measures

- To enhance workplace safety and reduce accident rates

Methodology

This study adopts a qualitative and quantitative approach to hazard identification and risk assessment.

Data Collection

- Field observations in manufacturing units
- Interviews with workers and safety officers
- Review of accident records and safety reports

Tools Used

- Hazard Identification and Risk Assessment (HIRA)
- Job Safety Analysis (JSA)
- Failure Mode and Effects Analysis (FMEA)
- Hazard and Operability Study (HAZOP)

Risk Evaluation Criteria

Risk is evaluated based on:

- Likelihood (Probability of occurrence)
- Severity (Impact of hazard)

Risk Rating = Likelihood × Severity

Hazard Identification in Manufacturing Sector

Common hazards identified include:

Mechanical Hazards

- Moving machinery parts
- Equipment failure
- Improper machine guarding

Chemical Hazards

- Exposure to toxic substances
- Gas leaks and fumes
- Improper handling of chemicals

Electrical Hazards

- Short circuits
- Faulty wiring
- Electric shocks

Ergonomic Hazards

- Repetitive motion injuries
- Poor posture
- Manual material handling

Environmental Hazards

- Noise pollution
- Poor ventilation
- Heat stress

Results and Discussion

The application of OHS techniques revealed that:

- Mechanical hazards had the highest frequency
- Chemical hazards posed high severity risks
- Ergonomic hazards were often overlooked but contributed to long-term health issues

Among the assessment tools:

- FMEA provided detailed failure analysis
- HAZOP was effective in process industries
- HIRA was simple and widely applicable

Implementation of control measures significantly reduced risk levels.

Conclusion

This study demonstrates that systematic hazard identification and risk evaluation using OHS techniques are essential for improving safety in manufacturing industries. The application of structured tools like HIRA, FMEA, JSA, and HAZOP helps in identifying potential risks and implementing effective control measures. The findings emphasize the need for proactive safety management and continuous monitoring to reduce workplace accidents and ensure worker well-being.

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