Health, Safety and Environment (HSE) in Industrial Installations

Target: 2nd Year Engineering Students

Instructor: Dr. GRINE Wassila

Chapter 1: Risk Assessment and Accident Analysis

Description: Introduction to Safety Systems for Industrial Engineering

Five-Session Roadmap

- **Session 1:** Introduction to HSE & Fundamental Concepts
- **Session 2:** Prevention Stakeholders & Safety Performance Indicators
- **Session 3:** Risk Analysis Methodology
- **Session 4:** Root Cause Analysis Methods
- **Session 5:** Risk Families & Integrated Case Study

SESSION 2: Prevention Stakeholders & Safety Performance Indicators

Date: 22/10/2025

18H30-20H00

Who is Responsible for Safety?

Safety is everyone's responsibility… but not to the same extent

Internal Stakeholders

External Stakeholders

Internal Prevention Stakeholders

- **Employer**: Legal responsibility. Must assess risks and implement prevention measures (Single Risk Assessment Document)
- **Employee**: Must follow procedures, report hazards, and has right to refuse unsafe work
- **HSE Committee**: Employee representative body. Consulted on projects, analyzes risks and accidents
- **Occupational Physician**: Medical advisor to employer, employees, and HSE committee

External Prevention Stakeholders

Ministry of Labor

- Legislation and Regulations
- Development of Safety Policies

Labor Inspectorate

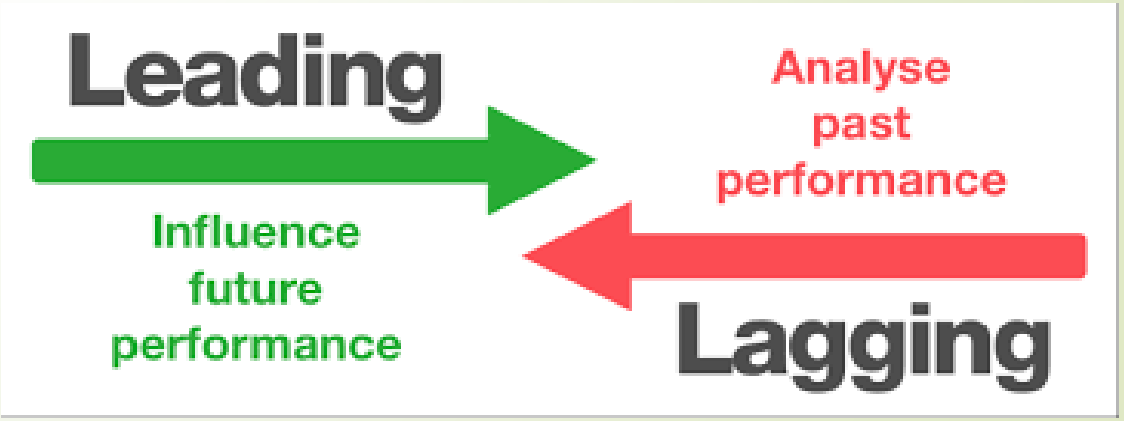
- Compliance Control
- Power to Sanction
- Inspection and Investigation

Social Security

- Occupational Accident/Disease Coverage (AT/MP)
- Compensation
- Prevention Programs

Why Safety Performance Indicators?

- **Principle:** "What gets measured gets managed"
- **Objectives:**
- Track HSE performance trends
- Identify action priorities
- Benchmark against industry standards



Indicator 1 - Frequency Rate (FR)

- **Definition**: Measures how frequently accidents occur
- **Formula:**

  FR = (Number of lost-time injuries × 1,000,000) / Hours worked

- **Interpretation:** Number of accidents per million hours worked
- **Example:** 5 accidents, 500,000 hours worked → FR = (5 × 1,000,000) / 500,000 = 10

Indicator 2 - Severity Rate (SR)

- **Definition:** Measures average accident severity based on lost days
- **Formula:**

  SR = (Total lost days × 1,000) / Hours worked

- **Interpretation:** Number of lost days per thousand hours worked
- ***Example:*** 200 lost days, 500,000 hours worked → SR = (200 × 1,000) / 500,000 = 0.4

Indicator 3 - Average Time Lost (ATL)

- **Definition:** Measures average absence duration per accident
- **Formula:**

  ATL = Total lost days / Number of lost-time injuries

- **Interpretation:** Indicates average accident severity
- **Example:** 200 lost days for 5 accidents → ATL = 200 / 5 = 40 days/accident

Indicator 4 - Frequency-Severity Index (FSI)

- **Definition:** Combines the frequency and severity of accidents into a single value to evaluate overall safety performance.
- **Formula:**

$$FSI = (FR \times SR) / 1{,}000$$

- **Interpretation:** Indicates the overall safety performance — higher values mean more frequent or more severe accidents, while lower values reflect better safety conditions.
- **Example:** If FR = 5 and SR = 200 →FSI = (5 × 200) / 1,000 = 1.0

Types of Appraisal of Safety Performance

Negative Safety Performance Meters (Lagging or reactive indicators)

- Accident Frequency Rate
- Accident Severity Rate
- Frequency-Severity index

Positive Safety Performance Meters (Leading or Proactive indicator)

- Housekeeping
- Layout
- Practices
- Training

Practical Activity - Indicator Calculation

- **Company "X" 2023 Data:**

- ✓ Average workforce: 120 employees
- ✓ Hours worked: 240,000
- ✓ Lost-time injuries: 4
- ✓ Total lost days: 125 days

- **Group Task**: Calculate Frequency Rate, Severity Rate, and Average Time Lost. What can you conclude about Company X's HSE performance?

Solution to the Practical Activity

- **Answer Key:**
- FR = (4 × 1,000,000) / 240,000 = **16.67**
- SR = (125 × 1,000) / 240,000 = **0.52**
- ATL = 125 / 4 = **31.25 days/accident**

Conclusion – HSE Performance Analysis (Company "X", 2023)

- The **Frequency Rate (FR = 16.67)** indicates a **moderate number of accidents** compared to the total hours worked.
- The **Severity Rate (SR = 0.52)** is **low**, showing that most accidents were **not severe** and resulted in limited downtime.
- The **Average Time Lost (ATL = 31.25 days/accident)** reveals that each accident caused, on average, about **one month of absence**, representing a **moderate impact** on productivity.
- **Overall conclusion:**

  Company X demonstrates an **acceptable HSE performance** — the accident rate remains within a reasonable level, and accident severity is relatively limited.

  However, it is recommended to **maintain and strengthen prevention and awareness programs** to **reduce the frequency of accidents** and **shorten recovery periods** in the coming years.

Overall HSE Performance Evaluation

Level	FR	SR	ATL (days/accident)	FSI	Evaluation
Excellent	< 5	< 0.5	< 10	< 1	**Very effective prevention system**
Good	5 – 10	0.5 – 1	10 – 20	1 – 3	**Acceptable safety performance, some improvements needed**
Average	10 – 15	1 – 2	20 – 30	3 – 5	**Moderate level, monitoring required**
Poor	> 15	> 2	> 30	> 5	**High-risk level, urgent corrective actions required**

Prevention is a shared duty — strong indicators mean strong commitment.

الوقاية مسؤولية مشتركة — فالمؤشرات القوية تعني التزامًا قويًا.

Thank you all for your attention