

A Study on Behavioral-Based Safety as a Key HSE Strategy in Chemical Manufacturing

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Abstract :- Many organizations have invested significant time and resources in improving workplace safety, primarily by addressing equipment-related issues and implementing safety management systems, including regular line management safety audits. While these efforts often lead to reductions in accident rates, minor incidents frequently persist and prove resistant to complete elimination. Although such incidents are sometimes attributed to employee carelessness or poor safety attitudes, the majority stem from deeply ingrained unsafe behaviors. A substantial proportion of workplace accidents are caused by unsafe acts and hazardous conditions created by employees themselves. To achieve further reductions in accident rates, employers must identify, evaluate, and address these at-risk behaviors. This study aims to examine and provide strategies to mitigate such unsafe behaviors effectively.

Keywords: Behaviour Based Safety (BBS), behaviour safety approach, BBS management. **Introduction**

1. Introduction

Workplace safety has long been a critical concern in high-risk industries such as chemical manufacturing. Over the years, various techniques have been employed to reduce unsafe workplace behaviors. These approaches range from sanctions, surveillance, and regulations to training-oriented and supportive initiatives. Such efforts may originate from employers, regulatory agencies, social partners, or even from individual workers' training, ideas, and development activities.

While these strategies have achieved some success in reducing accidents, the ultimate goal of any safety program is the establishment of a **comprehensive safety culture**. A complete safety culture is one in which:

- Safety is regarded as a **core value** rather than merely a priority.
- Individuals take responsibility not only for their own safety but also for that of their co-workers.
- Employees at all levels are empowered and willing to act upon their sense of responsibility, even going beyond the call of duty.

To achieve such a culture, certain **prerequisites** are essential:

- Strong and consistent management commitment to maintaining and improving behavioral safety.
- Transparent and fair leadership across all organizational levels, including managers, supervisors, and owners.
- Timely and constructive responses to unsafe behaviors, viewing incidents as opportunities for learning and improvement.
- Promotion of open, respectful, and feedback-rich communication between management and employees.
- Employee awareness of human factors, including attitudes, capabilities, and behaviors, that influence safety performance.

Objectives of Behavior-Based Safety (BBS) Management

Behavior-Based Safety focuses on both **environmental factors** (equipment, tools, systems, and workplace design) and **people factors** (attitudes, capabilities, and behaviors). The objectives of BBS management are to:

- Develop a culture of safety by emphasizing proper safety behaviors.
- Identify and mitigate hazardous or risky behaviors before they lead to accidents.
- Encourage employee participation in safety improvement efforts.

Significance of BBS in Safety Performance

The proactive nature of BBS allows organizations to detect and address safety issues in the accident causation chain before incidents occur. By concentrating on behavioral patterns and their interaction with the work environment, BBS helps in reducing events caused by unsafe practices. Implementation of BBS has been shown to deliver measurable benefits, including:

- Significant reductions in serious injuries.
- Decreased accidental leaks of hazardous chemicals.
- Fewer breaches of regulatory requirements.

In summary, the integration of Behavior-Based Safety within HSE initiatives offers a structured and proactive approach to workplace safety. By fostering accountability, communication, and safe practices at all levels, it contributes to a sustainable and holistic safety culture.

Behaviour-Based Safety (BBS) is a scientific, proactive approach that seeks to identify and modify unsafe behavioural patterns in order to foster a safer work environment. It systematically examines how employees perform tasks, investigates the reasons behind their actions, and applies targeted interventions to minimize risky behaviour.

Significance of BBS

The importance of Behaviour-Based Safety lies in its practical ability to address the leading cause of workplace incidents—**unsafe human behaviour**. While human error is often unintentional, it is influenced by complacency, habit, and shortcuts taken during high-risk tasks.

- Frontline workers are particularly vulnerable, as routine familiarity often leads them to overlook safety details or rely on unsafe shortcuts.
- These behaviours, though subtle, create a pattern that eventually results in accidents, injuries, or near-misses.

A well-implemented BBS programme provides **continuous monitoring across all organizational levels**—from management to frontline employees. Through observation, feedback, motivation, and awareness, the programme reinforces safe practices and minimizes unsafe actions before they result in harm.

Core Purpose of BBS

The main goal of a BBS programme is to:

- **Reinforce safe practices** through positive recognition.
- **Identify and address unsafe behavioural tendencies** before they escalate.
- Ensure consistent compliance with **EHS best practices** through timely intervention.

Principles of BBS

- **Define Target Behaviours** – Identify critical safe and unsafe actions.
- **Behaviour Checklists** – Develop observation tools to measure compliance.
- **Design Interventions** – Introduce strategies to encourage safe conduct and prevent unsafe practices.
- **Performance Tracking** – Chart and review behavioural trends regularly.
- **Feedback System** – Provide constructive, immediate, and effective behavioural feedback.

Advantages of BBS

BBS is often described as the “**Swiss Army Knife**” of safety programmes due to its adaptability and effectiveness. Proper implementation delivers wide-ranging benefits, including:

- A stronger focus on the **social and behavioural aspects of safety**.
- Increased workforce participation in safety initiatives.
- Reduction in unsafe or dysfunctional behaviours.
- Improved trust as management actively supports safety with resources and commitment.
- Higher employee morale and motivation, especially during the early phases of implementation.

The ABC Model in Behaviour-Based Safety (BBS)

The **ABC model—Antecedent–Behaviour–Consequence**—is a widely recognized framework for understanding and influencing workplace behaviour. It explains how external factors trigger actions and how the outcomes of those actions reinforce or discourage their repetition.

- **A – Antecedent:** The condition, event, or trigger that prompts a specific behaviour. Antecedents set the stage for how individuals act (e.g., warning signs, supervisor instructions, environmental conditions).
- **B – Behaviour:** The observable and measurable action taken by an individual in response to the antecedent (e.g., wearing PPE correctly, bypassing a machine guard).
- **C – Consequence:** The result that follows the behaviour. Consequences can be positive (reinforcing safe actions through recognition) or negative (accidents, penalties, or lack of reward).

This model highlights that behaviour is not random but shaped by what precedes and follows it. By managing antecedents and consequences, organizations can encourage safe practices and minimize unsafe ones.

Process of Improvement in BBS

To effectively apply the ABC model and improve workplace safety, a **seven-step strategy** is recommended:

1. **Identify Critical Problem Behaviours**
– Detect unsafe actions or patterns that pose risks.
2. **Identify Root Causes**
– Determine underlying triggers (antecedents) that lead to unsafe behaviours.
3. **Generate Potential Actions**
– Brainstorm corrective measures or behavioural interventions.
4. **Evaluate Possible Actions**
– Assess the practicality and effectiveness of proposed solutions.
5. **Develop an Action Plan**
– Formulate a structured plan with clear responsibilities and timelines.
6. **Implement the Action Plan**
– Put corrective measures into practice and adapt to changing conditions.

7. Conduct Follow-up

- Monitor outcomes, measure improvements, and ensure behavioural changes are sustained.

Reinforcement and Feedback in BBS

Feedback is the information provided to an individual or group about their behaviour and its impact (Braksick, 2007). It is one of the most powerful communication tools for guiding safe practices, maintaining health, and reinforcing positive behaviours in the workplace.

Feedback can take many forms, but it generally combines both **positive** and **constructive** elements. In a safety context, a feedback-rich environment not only improves communication but also enhances motivation and accountability.

Positive Feedback and Reinforcement

- Positive feedback strengthens desired behaviours by acknowledging and rewarding them.
- To be effective, positive feedback must be **specific, genuine, and timely**.
- For example, instead of a vague statement like “*Good job, Bill*”, effective feedback would be: “*Bill, your attention to detail while cleaning ensures the office pathways remain safe and unobstructed. Excellent work.*”
- This explicit recognition reinforces the exact behaviour that should be repeated and sustained.

Constructive Feedback

- Constructive feedback provides **clear, non-judgmental guidance** on behaviours that require improvement.
- It focuses on what actions should change rather than criticizing the individual.
- For constructive feedback to be effective, it should be paired with **specific improvement goals** and delivered in a supportive manner.

The 5:1 Rule

- Research suggests that maintaining a ratio of **five positive feedback statements for every one constructive feedback statement** creates an environment where employees are more receptive to corrective input.
- In such an environment, individuals are less defensive and more motivated to make behavioural adjustments.

Key Insight

Unsafe behaviours often occur not because employees are deliberately careless, but because they have not been adequately shown the correct behaviour. Reinforcement through clear, balanced feedback helps close this gap and builds a culture of safety.

Conclusion

Behaviour-Based Safety (BBS) programmes were developed to integrate principles of psychology into workplace safety, encouraging safe behaviours and reducing risk. Their effectiveness, however, relies heavily on the knowledge, expertise, and commitment of safety professionals who design and administer them.

In organisations with a high prevalence of unsafe practices, a well-implemented BBS programme can lead to significant improvements in safe performance, alongside notable reductions in workplace accidents and occupational illnesses. These outcomes not only reduce human suffering but also lower associated financial costs, such as medical expenses, downtime, and compensation claims.

Ultimately, investing in BBS is more than a compliance measure—it is a strategic approach to fostering a strong safety culture. The long-term benefits far outweigh the initial costs, as improvements in human performance, employee well-being, and operational efficiency create returns that multiply over time.

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