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IMPROVING WORKPLACE SAFETY THROUGH BEHAVIOR-BASED SAFETY MODELS

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Keywords	Abstract
BBS, Behavior Based Safety, Behavior Safety Approach, BBS Management, Behavior-Based Safety (BBS) models, emphasizing the role of individual behaviors, Attitudes, Organizational strategies in creating a safety-driven culture.	Over the years, many companies have dedicated significant time and resources to enhancing workplace safety. These efforts often focus on improving physical infrastructure, upgrading equipment, and implementing comprehensive safety management systems. A key aspect of these initiatives is the integration of routine safety audits conducted by line management, ensuring ongoing compliance and identifying potential risks. While these measures contribute to safer work environments, fostering a safety-first culture requires a balance between technical improvements and behavioural safety strategies. These efforts lead to a noticeable decline in accident rates. A persistent plateau of minor incidents often remains, defying conventional attempts to eliminate them. While these accidents are frequently blamed on carelessness or poor safety attitudes, they are more accurately rooted in deeply ingrained habits and behavioural patterns. Addressing these underlying behaviours through a human-centered approach is essential for meaningful and lasting safety improvements. A substantial number of workplace accidents are initiated through unsafe acts and the unsafe conditions created by the employees in the work place. The employers need to be aware that further reducing accidents can only be achieved by identifying, examining and focusing upon such unsafe behaviour or the at-risk behaviour. Those are covered in this article paper.



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1. INTRODUCTION

Workplace safety initiatives have evolved through various approaches, each contributing to the reduction of unsafe behaviors. Some methods rely on enforcement through penalties and surveillance, while others focus on guidance, policies, and structured procedures. Additionally, many strategies emphasize education, support, and hands-on training. These efforts stem from multiple sources—employers, social organizations, state regulatory bodies, and even individual employees who bring valuable insights, innovative ideas, and proactive engagement in health and safety practices. Across industries, safety professionals and employees generally agree that the ultimate goal is to establish a total safety culture—a work environment where safety is deeply embedded in everyday operations and behaviors. A total safety culture characterized by:

- Employees treating safety as a core value.
- A collective responsibility, for their own safety but also for the well-being of their colleagues.
- A commitment at all levels to taking proactive safety measures.

For a safety strategy to create lasting impact and contribute to a total safety culture, certain foundational elements are essential:

- Strong leadership commitment
- Open and transparent communication
- A culture of feedback and continuous learning
- Employee engagement and awareness
- Focus on behaviors, not just statistics
- Timely and constructive responses to unsafe behaviors
- Fair and transparent leadership
- Understanding human factors

What is Behavior-Based Safety?

Behavior-Based Safety is a structured, scientific approach designed to foster a safer work environment by addressing and modifying unsafe behavioral patterns. Rather than solely relying on rules and policies, BBS focuses on how employees interact with their work environment, identifying the factors influencing their decisions and actions. By analyzing why individuals engage in certain behaviors, organizations can implement targeted intervention strategies that encourage safer practices while reinforcing positive safety habits. The ultimate goal of BBS is to create a proactive culture where safety becomes an integral part of daily operations, driven by awareness, accountability, and continuous improvement.

Objectives of behavior Based Safety Management:

Developing safety culture in an organization requires special attention to two aspects such as;

- Environmental factors like equipment, tools, machines, systems, and workplace.
- People factor like abilities, job, skills, attitudes, and behavior etc.



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A proactive approach to safety emphasizes continuous attention to actual workplace behaviors, allowing organizations to identify and address safety-related risks before an incident occurs. By focusing on behavior-Based Safety, companies can move beyond reactive measures and work toward preventing accidents at their root cause. The primary objective of a BBS process is to reduce workplace incidents by addressing unsafe or high-risk behaviors. To achieve this, safety professionals analyze behavioral patterns and identify specific risk factors that arise from the interaction between employees and their work environment. Understanding these dynamics enables organizations to implement effective interventions, foster a culture of awareness and accountability, and ensure that safety is not just a compliance requirement but an integral part of daily operations.

Why is behavior-based safety important?

A Behavior-Based Safety (BBS) program plays a crucial role in reducing workplace injuries by addressing the most common underlying factor—human error. While these errors are unintentional, they often stem from habitual complacency, particularly in high-risk tasks. Frontline workers, due to the repetitive nature of their jobs, may inadvertently overlook critical safety details, leading to unsafe practices. As familiarity breeds efficiency, experienced employees sometimes take unnoticed shortcuts, reinforcing behavioral patterns that increase the risk of accidents—not just for themselves, but also for those around them.

A comprehensive BBSO (behavior-Based Safety Observation) program systematically monitors workplace behaviors across all levels, from management to frontline workers. By observing how employees carry out their daily tasks, organizations can provide continuous feedback, motivation, and safety awareness, helping individuals adopt safer work practices.

The ultimate objective of a BBS program is to create a proactive safety culture—one that emphasizes positive reinforcement rather than reactive correction. By identifying deeply ingrained unsafe behavioral patterns early, companies can implement timely interventions that encourage employees to continuously align with Environmental, Health, and Safety (EHS) best practices. When safety becomes an integral part of an organization's mindset, rather than just a set of rules, workplace hazards can be significantly minimized.

2. METHODOLOGY

This research draws upon workplace safety data collected from 2022 to 2024, highlighting trends in injuries and their causes. The models—ABC, SAFE, and ROLL—are analyzed for their applicability across industries, with a focus on psychological factors such as frustration, fatigue, rushing, and complacency. The study also explores critical error reduction techniques, including self-triggering, analyzing near misses, and improving habits through repeated training.

Models for behavioral Safety:

ABC Model: The Antecedent- behavior-Consequence model focuses on identifying unsafe behaviors and their triggers. While effective in theory, its resource-intensive nature and reliance on consistent observation limit its applicability in modern organizations.



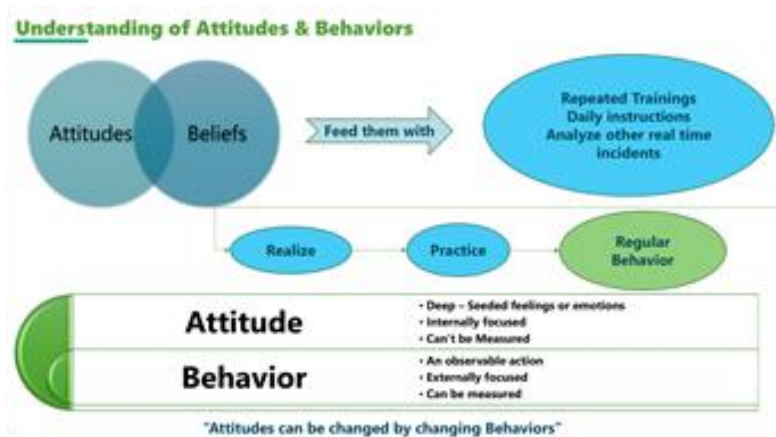
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SAFE Model: The SAFE Model—See-Act-Fix-Evaluate—offers a structured approach for immediate safety improvements. While effective for quick fixes, its focus is primarily on physical hazards and may require specialized training for risk assessments.

ROLL Model: The ROLL Model—Recognize-Observe-Learn-Lead—adopts a leadership-driven approach to safety. It emphasizes understanding root causes of unsafe behaviors and inspiring long-term change, promoting employee engagement and continuous improvement.

ABC – Attitude, behavior, Culture:

The ABC here standards for Attitude- behavior-Culture. The Attitude can be shaped by change in behavior which forms Culture within the organization. The Culture will influence the behavior and attitude of the unchanged or new person within the organization. Attitude is an internally focused and can't be measured, but behavior is externally focused and can be measured by the action is observable.



Analyzing & changing the behavior by imparting BBS Approach is important to avoid accidents

BBS – Culture Development:

- Incorporate BBS in safety slogans and pledges
- System incorporation: BBS in Risk assessment
- Encourage suggestions and Transparency
- Use of SAFE & ROLL Model behavior

3. RESULTS

Injury Statistics Data from 2022 to 2024 reveals total 34 injuries, with 65% attributed to unsafe acts and 35% to unsafe conditions. These findings underscore the significance of addressing behavioral factors alongside physical hazards.

Effectiveness of BBS Models

- SAFE Model: Quick hazard identification and mitigation led to immediate safety improvements.



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- ROLL Model: Enhanced employee engagement and leadership-driven interventions fostered sustainable safety improvements.
- ABC Model: Resource-intensive nature limited its effectiveness in large-scale implementations.

4. DISCUSSION

Addressing At-Risk behaviour: A Framework:



At-risk behavior impacts can be categorized into two key dimensions: self and others. Self-Directed At-Risk behavior: Its further categorized 2 divisions and they are,

- States of Mind
- Critical Errors

States of Mind & Critical Errors:

The “States of Mind” is which triggers the 4 Major “Critical Errors” which cause the risk of injury, in over a period of time which became major hazards.

States of Mind: Human states of mind—such as rushing, frustration, fatigue, and complacency—often contribute to workplace errors. For example:

- Rushing: Leads to accidents as employees prioritize speed over safety.
- Frustration: Causes irritation, increasing the likelihood of errors.
- Fatigue: Impairs decision-making and reduces awareness of hazards.
- Complacency: Reduces vigilance, leaving employees unaware of risks.

Critical Errors: The major 4 errors are

- Eyes not on task
- Mind not on task
- Balance/Traction/Grip issues
- Line-of-fire exposure

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At-Risk behavior Affecting Others: Coaching for the employees provided Proactive feedback, guidance, and encouragement reinforce safe behaviors, correct risks, and build a culture of accountability and shared responsibility for safety.

Critical Error Reduction Techniques (CERT): A Self-Corrective Framework



The Critical Error Reduction Techniques (CERT) framework is a self-corrective approach designed to help individuals identify and modify behaviour patterns that may lead to increased risk or injury. It focuses on building personal awareness and responsibility by addressing habitual actions that contribute to critical errors. The CERT model comprises of three key components:

1. Self – Trigger:

This involves becoming consciously aware of one's behaviour in real time, especially when entering high-risk situations. The concept draws from the foundational work of psychologist Kurt Lewin (1936), who proposed that behaviour (B) is a function of the person (P) and their environment (E) — expressed as $B = f(P, E)$.

2. Analyze near miss & small errors of self:

Individuals are encouraged to review and reflect on past incidents, particularly near misses and minor mistakes.

3. Looking for pattern that increases the risk of injury:



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Through consistent reflection and self-monitoring, individuals can detect recurring patterns on behaviour. Recognizing patterns is critical step in changing behaviour and reducing the likelihood of future errors. For effectively implement CERT, individuals must engage in a process of honest self-assessment by asking reflective questions such as:

- Which state of mind most often affects me (e.g., fatigue, frustration, complacency)?
- What corrective actions have I put in place to mitigate these states?
- Where am I in terms of achieving measurable improvement or behavioral change?

By regularly engaging with these questions, individuals can take proactive steps toward reducing critical errors and enhancing both personal and organizational safety outcomes.

Behaviour-Based Safety (BBS) Coaching Process



Behavior-Based Safety (BBS) Trainer Hierarchy

1. Team Training (Bottom Level):

- This foundational level focuses on training employees in safety principles and encouraging safe behaviours through observation and feedback.
- Employees participate in BBS training programs, where they learn to recognize potential risks and adopt proactive safety measures.

2. BBS Champions (Middle Level):

- BBS Champions serve as intermediary safety leaders, bridging the gap between frontline employees and BBS Coaches.
- They provide mentorship, reinforce best practices, and ensure employees consistently follow safety guidelines.
- BBS Champions may also be responsible for tracking safety observations and promoting a culture of workplace safety.

3. BBS Coach (Top Level)

- The BBS Coach holds the highest role in this hierarchy, overseeing training initiatives and guiding BBS Champions.
- They conduct one-on-one coaching sessions, lead safety meetings, and ensure continuous improvement in safety performance.



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- The BBS Coach also works with leadership to refine safety policies and integrate feedback from coaching sessions into broader safety strategies.

This structured approach ensures a continuous cycle of learning, coaching, and implementation, fostering a strong safety culture within the organization. BBS Coach Requirement: At least 5% of total head count.

The BBS Coaching Cycle is designed to cultivate a safety-conscious work environment through structured training, data-driven decision-making, and active participation. The process follows a systematic approach:

- Involvement of Employees plays a critical role in workplace safety and are encouraged to actively participate in the BBS program.
- Nomination of BBS Coach done by supervisors of that department, who are willing to be one.
- The BBS Coach acts as a mentor and trainer, guiding employees in safety practices and ensuring adherence to workplace safety standards.
- BBS Coaches gives specialized training for the BBS Trainers of every department to develop expertise in safety observations and corrective actions.
- Each BBS Coach is responsible for conducting safety coaching sessions to train at least five employees per month, reinforcing safe behaviours.
- Data Collection & Management Insights from coaching sessions are documented and stored in the BBS database for improvement and trend analysis.
- BBS Coach Meetings & Collaboration Regular BBS Coach short meetings provide a platform for discussing key observations, identifying risk patterns, and refining coaching techniques.

Benefits of BBS program

- Improved Safety Practices.
- Awareness of situational preparedness against a known hazard.
- React impulsively.
- Continuous feedbacks.
- Engage employee participation.
- Provides a benchmark to measure improvement.

5. CONCLUSION

Behaviour-Based Safety (BBS) programs were designed to bring psychological insights into workplace safety, helping employees adopt safer behaviors. However, their success depends on safety professionals who understand the origins and principles behind these programs. In workplaces where unsafe practices are common, well-implemented BBS programs can lead to dramatic improvements—reducing accidents, injuries, and health risks. Not only does this minimize human suffering, but it also significantly lowers financial burdens associated with workplace incidents. The investment in such programs pays off many times over, creating a safer, healthier, and more productive work environment.



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6. AUTHOR(S) CONTRIBUTION

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The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

8. PLAGIARISM POLICY

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