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HOW BEST CAN ORGANISATIONS FORECAST SAFETY CULTURE MORE ACCURATELY FOR ZERO-HARM?

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Abstract: *Safety culture could predict the incident rate, but the injury data cannot forecast safety culture. Safety systems believe that safety is the management's responsibility, but safety culture interventions emphasise that safety is an individual's role to behave safely and also to support others. The big question is, are employees safe at workplaces? Most corporates are not willing or able to decide between safety enforcements and a positive safety culture because they are not open to learning about the insights of safety cultures' positive effects on business. It is hard for them to think of safety beyond profits, production and business perspective until a major fire or fatality-like incident take place that impedes their business badly. The corporates cannot take the risk of not practising a positive safety culture strategy and a management action plan. As forecasting mechanisms, it is critical to know also the periodicity aspects of safety culture transformation, and that behaviour-based safety (BBS) 1.0 and 2.0 both together transform the safety culture into a positive work culture. Based on the comprehensive literature reviews and insights from the field practitioners, this paper describes ten stringent measures of forecasting the best safety culture more accurately towards achieving vision zero.*

Keywords: *Forecast, Safety, Culture, Organisations*

Introduction

Do we want to kill or disable people at work sites, if no, then the organisations essentially need to build and sustain a positive safety culture. Safety culture is an empathy in action at a personal level applicable at any place. Our workplaces are not safe until everyone is active in correcting unsafe behaviours. If our organisational leaders do not choose to make a planned change in their safety culture, any employee is likely to be affected by the incidents. Safety communications by the operations managers was the best predictor of safety culture, as well as developing training programs to help managers to understand safety roles (Tsung et al., 2010). A positive safety culture is a real-time intervention that provides measurable outcomes, transformational work experiences, activated leadership, empowered employees (ILO, 2017).

The April 1986 disaster at the Chernobyl nuclear power plant in Ukraine was the product of a flawed Soviet reactor design coupled with serious mistakes made by the plant operators. It was a direct consequence of Cold War isolation and the resulting lack of any safety culture (World Nuclear Association, 2022). Research and experience show that when a safety culture is strong, accidents are less frequent and less severe. A strong safety culture is predicted by:

1. Leadership is clearly committed to safety 2. Open and effective communication exists across the organisation 3. Employees feel personally responsible for safety 4. The organisation practices continuous learning 5. The work environment is safety conscious 6. Reporting systems are clearly defined and not used to punish employees 7. Decisions demonstrate that safety is prioritised over competing demands 8. Employees and the management work to foster mutual trust 9. The organisation responds to safety concerns fairly and consistently 10. Safety efforts are supported by training and resources (U.S. Department of Transportation, 2017).

Safety culture remains an undefined and incalculable phenomenon, until and unless there are free and frank discussions on safety issues across the organisation. The more the safety culture is discussed over a long period of time by most employees, the more it gets defined and calculated. Unfortunately, injury data provides no information about safety culture or predictability, but that's what traditional safety does. On the contrary, safety culture can predict the injury data. Forecasting is the foundation of traditional strategic planning and is viewed as something that shapes the future (Long, 2014). We implement solutions aimed at reducing accidents in everyday life, but we are not able to eliminate all accidents from our lives (Małysa, 2022).

But there is also a flip side to safety cultures. There is little evidence on the predictive value of safety culture assessment (SCA) in relation to how accident-prone an organisation might be. It has not only been demonstrated how a quantitative SCA mis-predicted future safety outcomes, but actually showed an inverse relationship between the assessment and subsequent critical incidents. Hence, it is to be taken in a very cautious manner, whether a SCA has a predictive capacity for safety outcomes (Boskeljon-Horst et al., 2022). More than assessments, real-time safety would depend upon how each person is active in the workplace surroundings each time.

Measures of Forecasting Safety Culture More Accurately

A clear picture of safety culture forecasting is possible only when organisations are able to act with regard to each of the series of measures for the best safety culture being implemented accurately under the guidance of a team of safety culture experts. The risk that corporates cannot take is not practising a positive safety culture strategy and an action plan. You are safe, just for now. How can we forecast safety culture more accurately? Table 1 describes 10 stringent measures of forecasting the best safety culture more accurately. Whereas each of these measures directly or indirectly impacts the success of safety culture, but largely, the change is achievable depending upon how long the focus is maintained by the employees. Professional development, including systems thinking and safety training, are the necessary steps along with the policy changes facilitating organisations to support learning from mistakes which would contribute to reducing human errors (Mahsoon et al., 2021).

Table 1: Stringent Measures of Forecasting Best Safety Culture More Accurately

Everyone is trained in caring behaviours as safety culture observer.
Everyone is an active observer for spot-correcting at-risk behaviours.
Continuous safety culture retraining for observations.
Daily accounting of at-risk behaviours.
Daily spot-corrections of barriers/hazards in safety.
Achieving a standard of zero at-risk behaviour and vision zero.
How often are the at-risk behaviours out-of-view of the supervisors/observers?
Are there any work areas that are out-of-view of the observers?
Safety culture is monitored by the corporate board and is linked to HSE index.
Did safe behaviour learned from workplaces transfer to home and other arenas?
To calculate forecasting: each measure carry 10 score multiplied by 10 = 100 total score

Most industries do not fulfil these measures of forecasting the best safety culture more accurately, even after years of safety culture interventions as continued focus has disappeared. On the contrary, the effectiveness of positive safety culture initiatives can be sustained for many years (Spigener et al., 2022).

Let us explain these ten stringent measures of forecasting the best safety culture more accurately for better understanding as below:

- Everyone is trained in caring behaviours as safety culture observers. Many organisations seem to assume that putting a safety culture process in place ensures employees will speak up when observing a co-worker's at-risk behaviour. This is simply not the case. There is certainly value in performing safety observations – safe and at-risk behaviours are recorded, and hazards are sometimes shared for useful education. But what about going a step further and taking the time to provide immediate and caring feedback to ensure employees continue their safe behaviour and correct their at-risk behaviour (Geller, 2018)? The observers need to be reinforced for accountability and rewards for their safety observations. Safety culture is increasingly recognised as a basic predictor for the delivery of safe and high-quality care (Ellis et al., 2022).
- Everyone is an active observer for spot-correcting at-risk behaviours. Let's understand the difference between caring and acting. No one wants to see an individual get injured on the job. This is caring. Yet, when workers are asked to muster the courage to offer advice to a peer who is working at-risk, many admit they do not act on their caring by providing behavioural feedback. And how many workers act to show sincere appreciation for a co-worker's safe behaviour? Many employees do not actively care for

people's safety. They don't go beyond their intrinsic caring and provide proactive injury-prevention action (Geller, 2018).

- Continuous safety culture retraining for observations. Studies show that an accident and injury at the worksite is the result of workers' behaviour and safety culture. The development of safety culture in the industry through leadership and training roles will provide a safe working environment (Misnan et al., 2008). Training staff on appropriate safety behaviours and requiring them to complete safety observations helps keep safety a priority and continuously reinforces the facility's commitment to incident prevention (Pritchard, 2022).
- Daily accounting of at-risk behaviours through creating more and better safety-related interactions improved the safety organisation's performance, and a changed trend in injury rates and improvement in safety culture was noticed (Nielsen, 2014). Companies should work at several organisational levels at the same time. It is necessary to include levels such as individual, group, workplace and management levels, thus taking a system perspective on at-risk behaviour (Aulin et al., 2019).
- Daily spot-corrections of barriers/hazards in safety. It was found that there are the following 4 categories associated with safety barriers: (1) Behaviour Barriers; (2) Management Barriers; (3) Awareness Barriers; and (4) Culture Barriers. At the same time, the most popular barriers are based on appearance in sources: lack of safety training, lack of commitment, work pressure is high when deadlines are approaching, and low-level education, lack of experience, and lack of knowledge. The actual safety of the projects should be focused on to reduce injuries and accidents, and reduce barriers to applying safety, which will enhance the sustainability and development of safe environments within the industry (Maliha et al., 2021). Eliminating fatalities and serious injuries is the main challenge for the global industry. The focus is to provide the industry with actionable recommendations and guidance to create safer and healthier workplaces (World Steel Association, 2022).
- Achieving a standard of zero at-risk behaviour. The perception of health and safety risks by workers is very different from that of the evaluators. Often, when workers identify a situation as low-risk or even zero-risk, the evaluator assesses the same context as maximum risk (Carpio-de et al., 2021). Also, there is a need to allow more time for managers and workers to talk about safety issues (Quenon et al., 2020) in order to achieve zero at-risk behaviour.
- How often are the at-risk behaviours out-of-view of the supervisors/observers? The supervision/observation of the at-risk behaviours provides challenges for safety culture improvement as it involves adequate time for interactions, discussion and toolbox talks for understanding issues to be rectified (Bayley et al., 2022). At the same time, daily abusive supervision negatively affects organisational citizenship behaviour for a positive safety environment (Wang & Xiao, 2022).
- Are there any work areas that are out-of-view of the observers? Research reported that people who perceive it to be normal for a site to ignore safety procedures are more likely to report taking safety risks in the future (Mark et al., 2020). Supervisors shaped the implementation climate by carrying out four roles (diffusing, synthesizing, mediating, and selling). The interaction of these roles conveys expectations and support, which can inform implementation practice (Bunger et al., 2019).
- Safety culture is monitored by the corporate board and is linked to the work culture. The psychosocial hazards (such as work culture, relationships, stress, decision-making process, and work organisation) fully mediate the relationship between safety culture and organisational safety performance (Naji et al., 2021). Safety cultures endure when they are part of an overall successful organisational culture (Paoletta, 2020). It is difficult until and unless the company directors want to end and fix the safety culture challenges.
- Did safe behaviour learned from workplaces transfer to home and other arenas? It requires family interactions on safety about the risks that involve their kins. Also, how actively the employees are able to reduce risks in a home environment for their family members and their neighbourhoods in promoting safe behaviours. Employees who adopt safe behaviours at work do not always do the same at home. Yet many people believe that good work practices extend into life at home and are an indicator that safety culture is deeply rooted (Balzer, 2015).

An Example of a Case of Sterlite Technologies Limited (STL)

The case below would help us understand the salient measures of a positive safety culture.

Due to safety culture implementation and the steering committee meetings being conducted, the workforce feels free to ask questions without fear and help in correcting rather

than criticising at-risk behaviours. The behavioural science approach enhanced the safety culture/safe behaviours of an organisation and reduced accidents and their resultant costs. The costs can be human costs (in the form of death or injury) or financial costs (in the form of damage to equipment, raw material, product, etc.

Month-wise data here below indicate that the at-risk behaviours reduced from 24 to 10 percent over a period of six months.

Month	Safe Behaviours	At-Risk Behaviors
October '21.	76%	24%
November '21.	87%	13%
December '21.	88%	12%
January'22	88%	12%
Feb'22.	89%	11%
March'22.	90%	10%

Approach adopted by STL management:

- Active participation from all including subcontractor workforce, business head, departmental head, front line managers, engineers, supervisors and workers.
- Empowering and making everyone responsible for their own and team safety.
- Observation and counseling with due respect as a part of organisation core value.
- Team leader performance evaluation based on individual performance with respect to process implementation.
- Adherence of transparency in EHS communication.
- Continue observations till reach the safe behavior and learns the concept of self-observation and observing others for safe operations.

Review of safety culture processes checklist for STL sites as below:

Mark each process below out of 10. Check, what's lacking.

- Safety cultural shift from reactive, dependent culture to independent, interdependent culture - Followed
- Leadership increased involvement - Followed
- Monthly BBS meetings - Followed
- Incidents reduction - Followed
- Behavioral trends improvement - Followed
- Sharing of at-risk behaviours during TBT - Followed
- Motivational reward, recognition for observers/units - Followed
- Managements regular observation rounds - Followed
- Regular repeat BBS awareness sessions for spot-correction - Followed
- Quarterly reviews across units/sites - Followed

Total score: 10x10 = 100,

STL score: 100%

The change in positive safety culture has happened over the years, and its sustainability needs to be constantly explored. The management should continuously monitor and evaluate their strategies while delivering multifaceted interventions to be more specifically focused and to motivate workers to be enthusiastic in sustaining a safety culture (Wong et al., 2021). Sembcorp Energy India Limited (SEIL) manages Health, Safety and Environment (HSE) responsibility as its core value (SEIL, 2023a). To further strengthen the safety culture and secure a positive behavioural change within the workplace, SEIL has implemented and integrated Behaviour-Based Safety into its safety systems across all the assets. ISO 45001:2018 mandates that human competence and behavioural elements need to be considered in risk assessment and as an internal issue for managing risks (SEIL, 2023).

Conclusions

Most of the safety culture committees in an organisation remain non-functional and as a result of which the benefits to the employees are absent. In fact, such professional teams can do wonders if they are active and focused on the objectives for which they are constituted. Some committee members are active initially, others are mostly passive. Actions of these safety management teams predict the strongest relationship to employees commitment to safety (Cox et al., 2002). The studies are successful at describing how employees perceive their work environment but are poor at predicting what this means for future (Cole et al., 2013). Moreover, the safety culture can predict the injury data, but Injury data could not forecast safety culture. Safety culture intervention involves all employees in the organisations for positive changes. Supervisors and training mediate the impact of management on employee commitment. Employee commitment has the biggest impact on safety culture satisfaction. Communication directly supports employee commitment (Tappura et al., 2022).

Safety culture is becoming an indispensable forecasting factor in achieving sustainable development (Jasiulewicz-Kaczmarek, 2022). There are ups and downs in organisational

safety culture. Consultant-driven dependent safety culture without adequate leadership and self-driven structure slowed down in several organisations. The steering teams in these companies did not function as adequately as at the beginning of the safety culture intervention. Later, they had to rejuvenate and support the interventions so that everyone was alert to observe unsafe behaviour on the spot as a standard operating procedure. As safety reporting is made more descriptive, though the observers do the corrections in the field, they hesitate to report as it is time-consuming. The risks of a poor safety culture include not having an easy-to-understand system for managing safety, which can increase costs significantly (ROSS, 2019). Moreover, it is easy to find fault, but it is easier to provide care, as a basic principle of positive safety perspective. Most companies suffered fatalities, and losses of property over the years, much before launching safety culture intervention, as they followed the blaming and fault finding - reactive safety culture loaded with hierarchies. One of the most important causes of industrial incidents, of which 90% are related to human factors, is to refuse to accept errors because of fear of blaming and concealing them. Evaluating the just culture, the safety culture of the employees of the organisation can be predicted with a high level of certainty, which shows the direct relationship between the just culture and the safety culture. So, increasing the just culture directly contributes to the development of the safety culture (Shabani et al., 2019).

Safety systems could give a safety climate, but not a safety culture. Safety culture enhances safety behaviours. Some organisations customise their safety culture intervention bypassing its core principles, which can prove to be risky in terms of real-time safety performance. Managements' sincere sympathy for employee safety is a precondition for safety culture implementation. The first few months of implementation initiate a safety climate, but it takes continued efforts to build a safety culture, resulting in expected levels of increased compliance and significantly reduced incidents towards achieving vision zero. Companies that implement Zero Accident Vision have an ambition that all accidents are preventable, and they achieve it through their commitment, safety communication, safety culture and safety learning (Zwetsloot et al., 2017). A Vision Zero city with approximately 680,000 residents, Oslo, Norway, had zero pedestrian fatalities, zero bicycle fatalities, and only one traffic death in 2019 (Short, 2020). Vision Zero action plan implementation considers the ethics and value of human life (Safarpour et al., 2022) and how quick the organisations are in decision-making and utilise their safety resources. Most organisations move slowly in deciding matters on safety culture goals due to a lack of accurate guidance and mentoring. Safety culture areas of improvement should be prioritised and immediately tackled, and the strengths of safety culture should be maintained (Mrayyan, 2022). Interventions designed to improve safety culture foster organisational environments that prevent safety events and support organisational learning when events do occur. A safety culture supports the required workforce behaviours and norms that enable safe care and well-being (Finn et al., 2022).

Every moment is a safety moment and an observation time, or it can be a moment of an incident, as risk is live anytime, anywhere. It requires management's will, motivation of employees, and meaningfulness of safe work to everyone to personalise safety culture. Forecasting the best safety culture accurately is integral and persistent to any work culture.

As forecasting mechanisms, it is critical to know the periodicity aspects of safety culture transformation, and that behaviour-based safety (BBS) 1.0 and 2.0 both together transform the safety culture into a positive work culture. The periodicity of safety cultural change would vary and depend upon the size of the organisation, the existing culture, leadership and so on.

Table 2: Periodicity of Positive Safety Culture Features and Transformation

1st Six Months	2nd Six Months	3rd Six Months	4th Six Months
1. Conceptual Awareness	Training/re-training/Tool Box Talk (TBT)	Mass-communications	Reverse TBT
2. Reactive safety culture	Dependent safety culture	Independent safety culture	Interdependent safety culture
3. HSE drive	Steering teams drive	HODs drive	Sites drive
4. Employees involvement	Contractors workmen	Office staff	Families
5. Correction based	Conversations	Care	Connect
6. Formal Reviews	Critical Reviews	Directors Reviews	Site Reviews
7. Quantitative analysis	Qualitative analysis	Barriers rectifications	Resources Provision
8. Observations driven	Data driven	Performance driven	Core Value
9. Safety systems activation	Behavioural safety	Psychological safety	Human factors/human error/cultural safety
10. Reporting Participation 20%	Reporting Participation 50%	Reporting Participation 70%	Reporting Participation 90-100%

The periodicity of the positive safety culture transformation is an important forecasting mechanism at sites, which reveals (Table 2) that during the first six months, there is about 20 per cent change in the company's safety culture in terms of reporting and participation, though the awareness and training are most likely 80 per cent completed. A dependent safety culture prevails as most HSE officers take ownership. The steering teams at the head office and regional offices are not taking ownership as they don't demand or enquire about safety reporting from the sites. Thus, despite safety culture trainings, there is only 20 per cent reporting by employees. Moreover, behavioural corrections by observers at sites don't necessarily entail conversations for imbibing safe behaviours. The disconnect between managers and observers remains. The employees need to talk every day about safety observations, which can happen only when safety is performance-based and managers stress it daily during their site rounds (Kaila, 2022).

It is good to note that behaviour-based safety (BBS) 1.0 and 2.0 both together transform the safety culture into a positive work culture. BBS 2.0 focuses more on organisational culture factors rather than individual behaviour. BBS 1.0 is observational in nature, whereas BBS 2.0 is more conversational for developing response mechanisms to combat multi-faceted organisational barriers while evaluating the accountability of leaders for leading the positive safety culture intervention as a long-term roadmap for businesses. Table 3 describes how BBS 2.0 is implemented qualitatively and conversationally at organisational levels for establishing safety dialogues across the board from the topmost level to the down-most/last person. It is important to fix the accountability of each of the BBS steering team leaders. It is important to understand that BBS 2.0 does not replace BBS 1.0, but both are complementary to each other (Lal, 2023).

Table 3: Basic Difference between BBS 1.0 & 2.0

Culture Building - Broad Focus of BBS 1.0 is on:	Perspective Building - Focus of BBS 2.0 is on:
1. Observations and corrections	Increased open and empathic conversations across levels, critical reviews, mass-communications
2. Employees as observers at all levels/areas	Integrating contractors, customers, stakeholders
3. Individual Behaviours	Organisational barriers/antecedents, resources provision
4. Corporate Steering teams	MD level, Board of Directors reporting, Challenge management's passionate involvement
5. Behavioural safety culture	Total safety culture:Psychological safety, human factors, human error, cultural safety, digitalising, integration
6. Steering teams commitment for months/years	Accountability evaluation of leaders/managers, performance & policy based commitment for long-term
7. Actively caring with empathy	HSE as core value and zero-harm, corporate rewards and reinforcements (digital and non-digital)
8. Quantitative score-board/measurement	Qualitative Site steering team/HODs monitoring
9. Safety and business perspective	Health, Safety, Environment, Well-being, Sustainability
10. Monthly monitoring and recognitions	Weekly monitoring and spot-rewards at sites

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