Organizational Culture and Safety

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Abstract

"..only a fool perseveres in error." Cicero. Humans will break the most advanced technological devices and override safety and security systems if they are given the latitude. Within the workplace, the operator may be just one of several factors in causing accidents or making risky decisions. Other variables considered for their involvement in the negative and often catastrophic outcomes include the organizational context and culture. Many organizations have constructed and implemented safety programs to be assimilated into their culture to assure employee commitment and understanding of the importance of everyday safety. The purpose of this paper is to examine literature on organizational safety cultures and programs that attempt to combat vulnerability, risk taking behavior and decisions and identify the role of training in attempting to mitigate unsafe acts.

Much attention has been paid to the contributions of various factors in accidents that have occurred in industries that share the common characteristics of low probability, high risk socio-technical systems characterized by strict legislation, potentially hazardous situations, many employees, intricate technology, and rigid timescales. Socio-technical systems are dependent upon the interaction of technical, human, social, organizational, managerial and environmental elements that may be singular or collective co-contributors to incidents. In response to this, organizations have initiated programs to discover and mitigate failures along a continuum rather than just at the end point. Organizations have sought to formalize these efforts into cultures that are aligned with their organizational culture. These safety cultures represent the amalgamation of individual and group values, attitudes, perceptions, and behavioral patterns that formulate the style and effectiveness of a safety program.

- High standards are often established to eliminate or reduce risks so that they are measurable and observable. However, on a day-to-day basis, the adherence to safety management practices may be obscured by appearances.
- Different levels of risk influence how involved society or an organization will become in its mitigation and
- often reflect the organization's attitude toward risk and/or it's role in its prevention or inadvertent promotion.
- An individual's acceptance of risk depends on whether or not s/he can control the outcome.
- If there is a discrepancy between how the environment is perceived and how it exists, employees may knowingly take chances that they believe are important to the achievement of a task (Turner, 1978).

People take risks: out of choice by evaluating the payoff, because they have no alternatives, because they are uninformed, because they are encouraged to do so, or because they might loose self esteem in the eyes of their family, friends or peers. They might miscalculate the level of risk because they have: a high commitment to the job, have been involved in a similar event, have not been penalized in the past and can probably get away with it again, or there is

sense of remoteness where there is a low probability they will encounter the event (Adams and Adams, 1998, O'Hare, 1990, Tuler, Machlis and Kasperson, 1996). Risk based decisions are typically made when the benefits outweigh the perceived risks.

Models applied to risk based culture and safety.

Literature and research on the relationship of organizational culture and safety has been increasing over the last 20 years with the emphasis on risk management and investigations into risk acceptance primarily on a retroactive basis. One of the earliest attempts to develop a safety culture was the Helicopter Safety Advisory Conference (HSAC) formed in 1978 after an accident in which 19 people lost their lives when a helicopter came in contact with a platform crane. Realizing there was a lack of communication between oil companies, service organizations, helicopter operations, and the helicopter industry, representatives of these companies agreed to work toward improved safety offshore. The HSAC effort is proactive in resolving issues of interest to the industry.

Australia has done extensive research on driving with some interest in cultural influences of accidents in their trucking industry. The airline industry has been at the forefront of developing safety cultures and evolving programs, targeting human error through Crew Resource Management (CRM) training programs designed to foster and maintain teamwork. England, in light of the Piper Alpha offshore oil rig explosion in 1988, has had to examine it's approach to safety and change the way organizations in high risk environments, train and acculturate their employees (Back and Woolfson, 1999). Medicine, until recently, has all but ignored the errors that have serious and often life threatening results.

Researchers look to several **models of risk taking to explain why people take risks**. These include the risk perception model, the social amplification of risk, resident latent pathogen model and variations on utility theory (Wahlberg, 2001, Louberge, and Outreville, 2001, Maurino, et. al, 1995). Utility theory is most often cited as the rationale underlying risky decisions because it is felt that neither social amplification nor the basic risk perception model provide statements of causal mechanisms (Farthing, 1996). Utility theory facilitates questions regarding pleasure-displeasure and perceived risk. Extensions of utility theory include subjective probability as well as distortions of probability. The latent pathogen model is one of the more current attempts to look beyond linear causal explanations of error.

Only one research paper identified a model to examine the relationship between culture and risk based decisions, the Subjective Expected Utility Theory (Farthing, 1996). Farthing started with this theory to provide a normative model for risky decisions influenced by culture but cited its limitations in being able to describe likeliness of engagement, and group differentiation between sensation seekers and cautious decision makers.

Reason (1991) focuses on the fallible decisions that are associated with processes common to all technical organizations (i.e. setting goals, organizing, regulating, managing, communicating, designing, building, operating and maintaining). These "seeds" represent conditions, that by themselves, are not dangerous. However, as these latent failures proceed along the path to the work environment, they fuel unsafe acts, few of which become actual errors because of the strength of a system's

defenses. It is the weaknesses that let the pathogens (virus-like dormant system deficiencies) slip by when they combine with local triggering events such as weather, location, communications, etc and the active failures at the proximate end – the pilot, the air traffic controller or the mechanic to cause accidents.

The Air New Zealand flight into Mt. Erebus on Antarctica underscores the notion that organizational culture and communication patterns influenced the actions of pilots, who, unwittingly flew directly into its base at 1500 feet (Casey, 1993). In order to make sightseeing more exciting, upper management changed the routing from circling the mountain to flying over the mountain prior to circumnavigating at lower altitudes. The aircraft's flight management systems was reprogrammed by avionics personnel but no one told the crew. Flight briefers advised new altitudes but not in the context of new routing. Air New Zealand pilots, therefore, assumed the altitudes were guidelines rather than requirements. None of the pilots had flown the tour - a policy requirement that was not enforced. As a result, they were unfamiliar with the white-out conditions, so prevalent in Anarctica, that prevented them from seeing the mountain once they ducked under the clouds.

Aviation has not been the only industry where these accidents have occurred. Some of the risks might be calculated risks driven by economics and/or resource availability. For example, the Union Carbide explosion in Bhopal, India (Casey, 1993) resulted from cutbacks in staff, failure to provide chemical sensors and environmental or worker safety regulatory policies while continuing to operate a plant that was deteriorating from poor maintenance. Being marginally profitable, most of the deficiencies were driven by economics. A pressure buildup within the chemical silos could not be abated because broken pipes and frozen valves propelled a geyser of toxic fumes into the air. The neutralizer, water, could not be ported to the heights of the plumes because of a lack of pressure and late decisions over methods to counteract the chemical. Over 2500 lives were lost. As a result, an entire industry sought to reevaluate its approach to dealing with low-probability, high-consequence risks (Kunreuther and Meszaros, 1997).

These crises illustrate how cultural problems can permeate industrial society and point to the need for more aggressive attention to be placed on the collective role of the organization's elements in risk taking. The culture of an organization often produces conditions and mechanisms that undermine safe practices by influencing the task environment (Maurino, Johnston, Reason and Lee (1995).

Organizational Culture

Culture is defined as a complex pattern of beliefs, expectations, ideas, values, attitudes and behaviors in an organization that binds members together and influences what they think about themselves and what they do (Hellriegel, Slocum, and Woodman, 1998; Wagner and Hollenbeck, 2000). It evolves over time as a product of assumptions and values transmitted through artifacts (objects and visible features of an organization) history, myths and mentors (Argyris and Schon, 1978). Culture is built on long term experiences but it must convey, on a daily basis a climate of tangible as well as qualitative outputs of it's emphasis on safety.

Organizational culture can create stress and accidents by communicating expectations

for behavior that are ambiguous and inconsistent with a worker's mental model. Within a culture, subcultures form and often hold values that incorporate the parent culture but embrace it's own sense of being. If it is taken for granted, (Smallman and Weir, 1999) employees might hold differing social constructions of what problems exist or how work should be performed which serve as impediments to communication.

International organizations or partnerships with other cultures might also find the national culture dictates attitudes and behaviors that might influence response during emergencies. As in the Riyad accident, cultural attitudes towards women and employees of different stature, impeded the evacuation of the aircraft in a timely fashion. As a result, all crew and passengers were lost due to the Captains inability to act on information provided by the aft cabin.

The notion that employees' knowledge of what goes on comes from signs, signals and images promoted by the organization, is in concert with what Kasperson calls the social amplification theory of risk (in Smallman and Weir, 1999). Risk behaviors are stimulated by a signal spread throughout an organization, and the value of the signal is influenced by the organization and its members. The distortion of the message results when perceptual gaps exist between different groups in their assessment of hazards and crises, i.e. the organization and the employees, management and staff. Whyte, (1998) found that workers believe management is preoccupied with reducing accidents and not necessarily providing the environment and tools to accomplish this goal. This has been experienced by regional airlines where employers that focused on economics as the primary driver in operational efficiency influenced attitudes and accident rates (McFadden, 1997).

Additionally, communication flow is interrupted during times of crises, resorting to spasmodic transmission and a shift in hierarchy towards individualistic behavior. Strong group structures can break down in a way similar to the breakdown of cognitive processing into more controlled, declarative problem solving. (Thompson, Stradling, Murphy and O'Neill, Back and Woolfson, 1999). And finally, managers and employers often speak a different jargon, impeding communication.

This research suggests that when formulating change towards a safety oriented organizational culture, change agents must recognize not only the overall beliefs and expectations of the organization but bind the group structure into the whole by recognizing the unique characteristics and subcultures of it's parts.

Safety Cultures.

Safety cultures that are imposed by management are designed to pull the workplace into a common understanding of the practices necessary to prevent errors and accidents. Their roots are often embedded in catastrophes and industry-wide attempts to change the way work is performed. Researchers disagree as to how effective safety cultures are but the general consensus is that safety cultures have value in bringing accident trends into the foreground as the foundation for determining how change must be effected (Remi, 1998, Back and Woolfson, 1999). In contrast, later research appears to focus on how safety cultures devalue and erode the collective understanding and informal structures that give the workplace meaning. Criticism includes the dismissing of alternative views and ideas because it contradicts the notion of a unified ideology. Failure to recognize

subcultural attitudes and needs at the time of an emergency can interfere with emergency response. In a society where outsourcing and subcontracting are becoming common economic tools, then recognition of multiple sources of cultural interaction will be critical (Woolfson, Foster and Back, 1996) as well as cultural attitudes brought into the organization from the source organization. Lack of commitment from contract employees may also interfere with cultural development and diffusion of responsibility for creating or mitigating unsafe acts.

Research on Risk Perception: Organizations can influence their employees' perceptions of risk by the context and culture of the work environment that define risk (Mearns, Flin and O'Connor, 2001). In some cases, organizations overstate the degree to which its culture is safety or risk-oriented during initial stages of socialization for new employees. This gives employees a false sense of security in hazardous events. In other cases, employees might be threatened with job insecurity for failing to follow company orders (Cable, Aiman-Smith, Mulvey, and Edwards, 2000).

Cognitive biases Torbjorn (2001) and Hamilton (1988), have found a relationship between risk perception and risk taking behavior. In cultures where the acceptability of rule violations is tolerated, subjects took chances and broke safety rules. This is supported by Moscovici (1988) who found that people construct mental models of hazards through social representations that are influenced by subcultures within an organization. Cognitive biases, such as these, play a major role in non-adherence to safety recommendations leading to risk taking behaviors (Sultan, Bungener, and Andronikof, 2002).

Employee status: Perceptions of an organization's emphasis on safety may be based on the employees status in the organization whether blue or white collar (Harvey, Bolam, Gregory and Erdos, 2001). Safety training interventions were used to improve attitudes and beliefs among management and professional employees as well as shop floor staff in the nuclear industry. In a pre-post test treatment, professionals and management showed a significant change in attitudes while shop employees did not respond to safety initiatives. Fonne and Myhre, (1996) found that occupational cultures, attitudes and values from different professional backgrounds among airborne emergency medical team members (doctors, pilots and paramedics), influenced the interpretation of rules and procedures.

More evidence of discrepancies in safety cultures that exist within the same high-risk organization was found in a study of nuclear power plants. Differences in attitudes were identified between layers of management and/or from plant to plant (Harvey, Bolam and Gregory, 1999). They determined that an organizational culture that emphasizes productivity over safety leads to employees cutting corners and causing accidents. Although Haravey, et. al. speculates that risky situation response may be less a matter of learned behavior of a safety culture than hard-wired reactions.

Complexity, risk proneness and safety: Complexity and risk proneness of an environment appears to encourage tighter control but can confuse emergency situations. What they do: In order to stem risk, organizations seek more top-down bureaucratic control, creating formal rules and procedures. Bax (2000) suggests that formal rules and procedures decrease controllability of a risk prone situation.

Employees don't understand or know about all the rules, so they apply their own informal procedures to the dynamics of the situation violating rules they feel are without value. Additionally, if economics and efficiency are paramount, employees might have to choose between production targets and safety by ignoring rules. Evidenced in aircraft diverting so that they won't have to return-clarify.

Bierly and Spender (1995) in their study of a nuclear submarine environment, - one of high risk, low probability and catastrophic results – suggest that there must be a mechanism for culture to interact with and support a formal structure to increase reliability and reduce the potential for risk taking and accidents. Bax (2000) cites Perrow's (1984) contention that centralization is essential in these cognitively focused systems to manage tightly coupled systems. However, the ability for loosely coupled systems to operate within that construct and isolate failures is critical.

Mitigating Risk through Safety Training

In the airline industry, training represents a large part of the overall budge that might undergo scrutiny and cost reduction. However, the economics of optimizing operations is often tempered by the fear of an incident that might result from inadequate training of a flight crew. Can training reduce risk through intervention? Several researchers believe that training is crucial to not only decreasing risk taking but also reducing cultural differences in attitudes and between grade levels of employees (Helmreich, et al, 1998). Training can address failures in not only procedural skills, but leadership, team coordination and decision making by focusing on their causes. Some industry experts suggest that CRM

training has not produced a corresponding reduction in accidents. Even with the best of intentions, employees can be on either the positive or negative side of adopting the safety culture of an organization, but it is not always an easy task to shift the non-believers to the other side through training (Harvey, Bolham and Gregory, 1999). In some cases it might be more beneficial to try to make the best of differences by maximizing the best beliefs and practices and minimizing the worst for all levels rather than try to change them.

Efforts to reduce risk have been directed toward the driving domain at a Swedish telephone company. During this study, drivers were exposed to driving techniques training and peer discussions which subsequently were effective in improving the risk, measured in accidents per kilometer (Gregersen, N. B. and Berndt-Moren, B. (1996). However, Torbjorn (1995) found that the perception of risk depended on whether or not an employee had been injured on the job. The results suggested that before an accident, culture might have influenced employee attitudes that safety was important to the organization. However, risk perception changed once an employee had been involved in an accident undermining job satisfaction and dissatisfaction with safety status. Efforts to change these factors should target employees who had suffered an injury.

Helmreich and Merritt's (1996) discussion of a safety culture includes the commitment to training and effective maintenance as well as reinforcing safe practices and establishing open lines of communication. They stress management's need to understand the roots of error and risk in the organization. The *five point error reduction* program includes cultural components of trust for senior management to adopt and support safety,

commitment to an organization wide emphasis on error reduction, supporting data on the nature and types of errors, training in error avoidance and the assessment and reinforcement of error management from the top down.

While Helmreich espouses the trickle down theory of organizational safety culture programs targeting risk reduction, Harvey, Bolam and Gregory (2001) suggest that safety training initiatives to reduce risk taking behaviors might be conducted in multi-level teams, using a content and context that considers differences in internal cultural beliefs. Some airlines do conduct CRM training with mixed groups of cabin and flight crews. This is best done by first understanding what the different safety cultures are, who the members are and what communication styles and motivational techniques will help change behaviors.

Conclusions

Researchers have found that safety cultures appear to be multi-layered or multi-dimensional according to the level of the employee, the nationality or the subcultures within the organization. While no one disputes the need for developing a safety culture to minimize risk, a consensus on how it should be created is lacking. Involving all parties to participate in constructing both the framework and content of a safety program is emerging as the dominant recommendation (Remi, 1998;Back and Woolfson, 1999, Cook, Woods and Miller, 1998).

The efforts of researchers to identify subcultures, jargon and other impediments to infusing safety information and subsequently a safety ethic will be important to any program that is being developed. Training should consider means of communicating between subgroups so that everyone understands the message.

In considering this theme, the analysis of accidents upon which some safety cultures act, does not only differ between experts and novices but that it is also linked to certain culturally determined biases in the investigator. Behind the analyst is the investigator's affiliated social group within which beliefs, value systems, norms, shared experiences, attitudes, roles, social and technical practices, etc are exchanged. If training is going to result from post-hoc analysis, then subject matter experts from all possible affected units within the organization as well as outsource participants should be involved in the analysis. Drawing from the 360° feedback concept (Wagner and Hollenbeck, 2002), a full circle of observers, peers subordinates and in some cases external participants might provide an all-around assessment of the causal chain and recommend appropriate resolutions.

Training and mitigation programs should be developed in an evolutionary manner involving all organizations that have a legitimate interest in safety. If safety training is going to be effective, the ideology that evolves and becomes part of a safety culture must be comprehensive in order to effect changes (Back and Woolfson, 1999). Therefore, if an organization is going to improve reliability and safety through training, it needs to continuously learn about the system and communicate that information through both formal and informal vehicles of the organization. To learn about the system, the organization must understand the breadth of the situations that have led to the determination that changes must be made. Knowing the full story requires that analysts look beyond the end point of failure into contributory factors.

In order to open the door to communication, the organization must cultivate a culture that openly acknowledges where failure has occurred and provides the freedom to its members to discuss issues, methods and outcomes without fear of retribution.

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