

Relationship of safety culture and process safety

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Abstract

Throughout history, humans have gathered in groups for social, religious, and industrial purposes. As the conglomeration of people interact, a set of underlying values, beliefs, and principles begins to develop that serve to guide behavior within the group. These “guidelines” are commonly referred to as the group culture. Modern-day organizations, including corporations, have developed their own unique cultures derived from the diversity of the organizational interests and the background of the employees. Safety culture, a sub-set of organizational culture, has been a major focus in recent years. This is especially true in the chemical industry due to the series of preventable, safety-related disasters that occurred in the late seventies and eighties. Some of the most notable disasters, during this time period, occurred at Bhopal, Flixborough, and Seveso. However, current events, like the September 11th terrorist attacks and the disintegration of the Columbia shuttle, have caused an assessment of safety culture in a variety of other organizations.

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1. Safety culture versus safety climate

Safety culture can be viewed as the overarching policies and goals set by an organization relating to the overall safety of their facility or environment [7]. It is frequently referred to as “the way we do things around here.” Safety climate is another buzzword often used interchangeably and in conjunction with safety culture. While both phrases can be used to describe the underlying safety attitude of an organization, safety climate generally refers to the attitude the people in the organization have towards safety. It describes the prevailing influences on safety behaviors and attitudes at a particular time. Culture can be viewed as the background influence on the organization, while climate is the foreground [1]. As a result, safety climate changes more quickly and more readily than safety culture. In the aftermath of a significant accident, it is the climate of an organization, rather than the culture, that will undergo immediate modification. However, if the underlying culture is not sufficiently and accordingly altered

to support the climate, further incidents are inevitable. The primary example of such a phenomenon can be found in the duality of the Challenger and Columbia disasters experienced by NASA. Following the Challenger explosion, the climate at NASA was strongly oriented towards improving safety performance. However, because the underlying culture did not adequately promote the importance of placing safety as a priority, the safety climate degenerated to such a dangerous degree that the Columbia disaster resulted.

In retrospect, it is easy to see the deficiencies present in the culture at NASA between the incidents. There are several characteristics that identify a good safety culture and strong safety climate, and historically, these simply had not been integrated into NASA's culture. These characteristics include: a *commitment* to the improvement of safety behaviors and attitudes at all organizational levels; an organizational structure and atmosphere that promotes open and clear *communication* where people feel free from intimidation or retribution in raising issues, and are encouraged to ask questions; a propensity for *resilience and flexibility* to adapt effectively and safely to new situations; a prevailing attitude of constant *vigilance*. While it is difficult to physically measure these characteristics, it is certainly possible to observe them. The importance of each characteristic

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and its identifying features are discussed in detail in the following sections.

2. Characteristics of a good safety culture

2.1. Commitment

One of the primary characteristics of a good safety culture is a definable commitment to the improvement of safety behaviors and attitudes at all organizational levels. It is intuitive to assume that organizations dedicated to the improvement of their safety culture will begin to generate the additional features necessary to achieve a good safety culture. While it is imperative that each employee be committed to creating and maintaining a good safety culture, this commitment must begin in the boardroom.

The boardroom influences two aspects of safety. First of all, the Board should recognize that expenditures on safety provisions cannot be subject to the normal rigid financial review in terms of the rate of return on an investment [6]. Organizations with good safety culture will have constant or increasing budgetary allotments for safety issues like preventative maintenance, upgrades, and extra personnel. They will not allow safety matters to suffer in an attempt to maintain the bottom line.

The second influence of the boardroom stems from the fact that people, in general, do what management does, not what it says. If Board members and subsequent levels of management place high value on safety matters and safety considerations, then their sub-ordinates will do the same. The trickle down effect of safety awareness is vital to the creation of a good safety culture because “if people are not safety conscious, then no amount of gadgetry, fail safe devices and back up alarms can ensure safety” [6]. The value safety has to the organization will be reflected in how safety concerns rank in the company hierarchy. For instance, legal and environmental matters are often of such concern that many companies have a chief legal officer and vice-president of environmental affairs within their organizational structure. Therefore, organizations who value safety will have included in their Board members a safety committee chairperson, vice-president of safety affairs, or other officer of equivalent standing. Additionally, within each sub-ordinate level of the organization, there should be a safety coordinator or system in place [10]. Placing safety concerns in a prominent position demonstrates to employees that safety is a priority. By serving as examples in safety awareness, it will be easier for management to motivate their employees to strive for a safer work environment.

The truly committed organization dedicates resources to create an atmosphere in which employees desire to work safely by eradicating both ignorance of safety issues and apathy about following safety precautions. Doing so promotes the establishment of a good safety culture as employees begin to feel responsible for their own safety, and also for the safety of their peers [4]. This “want-to” attitude of safety compli-

ance can be achieved with efficient training programs that teach, motivate, and sustain safety knowledge [3]. It is hard to generally quantify the most effective frequency of safety training, as requirements will vary from industry to industry as well as between levels of service. However, in an organization with the ideal safety culture, the overall goal of safety training and education programs should be to create a knowledge base within the employee and to promote the desire to expand it. Supervisors and managers who empower and encourage workers to take charge of their own compliance with safety regulations will help achieve this goal [10]. “By demonstrating a real concern for each employee, leadership helps establish a mutual respect, and the foundation is laid for a good effort” [3]. Most importantly, once the desire to work safely and to increase safety knowledge has been developed in employees, organizations must have readily available resources to fulfill this desire. They must provide adequate training and educational materials. These include the appropriate emergency procedures, regulation requirements, material safety data sheets, up-to-date process and equipment specifications, results of hazard analyses, and any other supplemental material necessary. If employees are unable to participate in training exercises or educational opportunities because of administrative constraints or lack of availability, their attitudes will change to reflect the seeming apathy of the management and the “want-to” safety environment will never be achieved.

Some organizations that have successfully developed good safety culture have demonstrated their commitment to safety by extending their focus beyond their facility borders. DuPont, in particular, believes that safety should be a part of every person’s life. “Employees should not ‘turn safety on’ as they come to work and ‘turn it off’ when they go home” [3]. Also, in many cases, more workdays are lost due to off-the-job accidents than on-the-job accidents. As a result, DuPont encourages the development of off-the-job safety programs. For instance, the Swiss national railway system, SBB, wanted to reduce the number of workdays lost as part of an effort to improve their overall occupational safety record. After working with DuPont consultants, they launched a campaign to reduce off-the-job injuries through activities like subsidizing the purchase of cycling helmets and covering the costs for employees to have ski bindings professionally adjusted [3]. Programs such as these help employees internalize safety and subsequently improve the safety of the company [3].

An organization truly committed to improving their safety performance will avoid excessive focus on production rates or meeting schedules. An unbalanced focus on production or measurable events like product volume or incident occurrence will lead to the idea that safety and prevention are not important [9]. This type of environment will inadvertently promote the use of safety short cuts that may speed production, but ultimately endanger the employees. Focusing on production will also cause employees to favor the implementation of symptomatic solutions to technical problems. If a particular symptom has been successfully eliminated without

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