



Analysis of Safety Culture Components based on Site Interviews

Akira UENO^a, Yuko NAGANO^a, Shojiro MATSUURA^b

^a Secretariat, Nuclear Safety Commission, Cabinet Office, Japan

^b Chairperson, Nuclear Safety Commission, Cabinet Office, Japan

Abstract. Safety culture of an organization is influenced by many factors such as employee's moral, safety policy of top management and questioning attitude among site staff. First this paper analyzes key factors of safety culture on the basis of site interviews. Then the paper presents a safety culture composite model and its applicability in various contexts.

1. Introduction

A healthy safety culture plays a crucial role in safety assurance of nuclear facilities. On the contrary, decline of safety culture increases the possibility of errors and accidents. The reasons for shifts in safety culture (from healthy to unhealthy situation or vice versa) can be determined by analyzing several typical cases of the sites and their context.

2. Essential factors extracted from the group interviews with site employees

The Nuclear Safety Commission (NSC) of Japan has had group interviews with employees of nuclear facility sites all over the country since July 2001. The interviews were carried out directly by the chairperson of the NSC and a few of Commissioners, who have visited ten nuclear sites and exchanged views on safety culture with section chiefs by April in 2002. In this section we present an overview of good practices and problems gathered in the group interviews and classify factors that compose safety culture.

2.1. Good practices enhancing a safety culture

We would point to some of good practices, listed as follows, for a healthy safety culture in the nuclear facilities where the group interviews on sites were held.

- 1) Boosting motivation and morale of individuals
 - Set out basic rules for actions, mottos and illustrated posters on a section-by section basis (e.g. Establishing 7 basic rules at workplace)
 - Let younger staff have the time to sit in Zen meditation (in a cross-legged position) to cultivate their moral senses
 - Put up a board with the names and photographs of each day's workers, near the entrance of the workplace for increasing their sense of responsibility
 - Build an organizational climate to actively investigate problems (e.g. Daily group discussion, rotational talking)
- 2) Learning a lesson from past mistakes, being able to be informed each other
 - Investigate causes of the errors thoroughly not to repeat the same ones
 - Make a database of small troubles in which site workers voice their concern for the possibility of the troubles leading to accidents (called "Hiyari-Hat" experience in Japan)
 - Learn lessons from troubles in other facilities and industries
- 3) More effective learning and training, with frank communication

- Trainees make their manual by themselves to prevent taking the existing manual on trust and understand multifacetedly what is described in it
 - Share small trouble experiences (near-miss incidents) through regular report meeting
 - Simulate accident situations (case studies or virtual simulators)
 - Risk predictive activities by small groups (e.g. Investigation of causes of disaster examples)
- 4) Realizing open communication inside and outside the site
- Opinion box to seek employees' views and proposals, which gives employees much opportunity to speak out freely and get a feedback from views of the workplace
 - Cultivate a questioning attitude (Organizational climate of recommending subordinates to propose or question to their bosses)
 - Executive director's regular visit to the sites
 - Take members in subcontracting companies into the party to issue house journals, have a campaign of exchanging greetings among workers cheerfully and host social gathering meetings
 - President's visit to contractors and lecture on the safety there
 - Local meetings with local for younger staff to explain their own daily behaviors to local people (Thereby younger staff can know general society)
 - Actively Open a facility to local people

2.2. Important problems in safety culture

We will list some of important problems with which nuclear facilities are confronted, as follows.

- 1) Problems in relation to changing circumstances around the nuclear industry
- Decline in motivation of younger employees under the adverse wind against the nuclear industry
 - Change of business environment (Future concern about safety-economics trade-off)
 - Weakened morale due to unreasonable regulation
- 2) Problems in relation to awareness of employees
- Unique attitude of younger employees that they manage their work well but don't consider it carefully
 - Lack of customary report, communication and consultation
 - Difficulty of changing an inclination to hide their own mistakes
 - Expanded and complicated manuals because of reflection of many lessons from past experiences
 - Lowered adaptation to rare events through employees' excessive dependence on manuals (merits and demerits of manuals)
- 3) Problems in relation to difficulty in taking over experiences and skills
- Difficulty in developing human resources and organizational culture because of regional characteristics and multicultural background
 - Difficulty in handing lessons from the past accidents on to the younger people who don't have their experience nor knowledge
 - Difficulty in handing the hard experiences in the early days of nuclear power development on to the next generation
- 4) Problems in relation to difficulty of communication inside and outside sites

- Organizational climate of Inhibiting subordinates from making suggestion to their bosses
- Difficulty in establishing an organizational identity due to collection of various contractors
- Difficulty in coping with frequently changing contractors

2.3. Key factors of safety culture based on site interviews

The result of group interviews on 10 nuclear sites, as we showed above, has identified several items of concern and interest common to the sites, based on classification by good practices and problems. We can summarize those items related with safety culture as the following keywords. *Motivation, Morale, Communication, Experience and Learning, Adverse Wind against Nuclear Industry, Risk Awareness, Top Manager's Attitude*

Especially “Communication skipping hierarchy” must be noted as the most effective one for a healthy safety culture. Such communication of knowledge and will on safety has psychological influence, that is different from that of commands by bosses. It produces a pleasant atmosphere for a safety culture all over among the persons communicating directly.

3. How to think the components of a safety culture model?

Survey of existing safety culture assessment methods and safety culture management tools shows that three factors are common to the components of safety culture [1][2]. These factors can be summarized as follows:

- (a) Individual's safety consciousness and behavior.
- (b) Organizational features of site (e.g. Rank relationship and communication).
- (c) Awareness of working environment.

These are the internal factors of safety culture of an organization (components of safety culture in a narrow sense). On the other hand, there exist some external factors that can affect safety culture. The external factors, including “local community”, “mass-media”, “public sentiment”, “industry” and “regulators”, and “market force (deregulation, price competition)” have not been discussed so much in the concept of safety culture. We suggest here that they must be included in the safety culture in a broad sense, for the sake of development of effective management plan.

The factors that influence situations of safety culture are described in Fig. 1. The inner area of the broken line shows the inside of certain (facility) site. Safety culture of an inner organization is categorized into three elements: individuals, group/organization, and working environment. Each of these safety culture elements also contains component factors². The external factors of Fig.1 can influence some or all the components of internal factors in accordance with various situations.

¹ The element of individuals contains two factors, “motivation” and “morale/ethics”. The element of group/organization contains “communication” and “management”, and the element of working environment contains “man-machine interface” and “risk perception”. As three factors are strongly connected with one another, there exist some factors that belong to two or three elements. The overlap area of the elements of individuals and group/organization contains “leadership”. The overlap of the elements of group/organization and working environment area contains “learning/training”, and the overlap of the elements of working environment and individuals contains “experience/expertise”.

External factor (societal/cultural background)

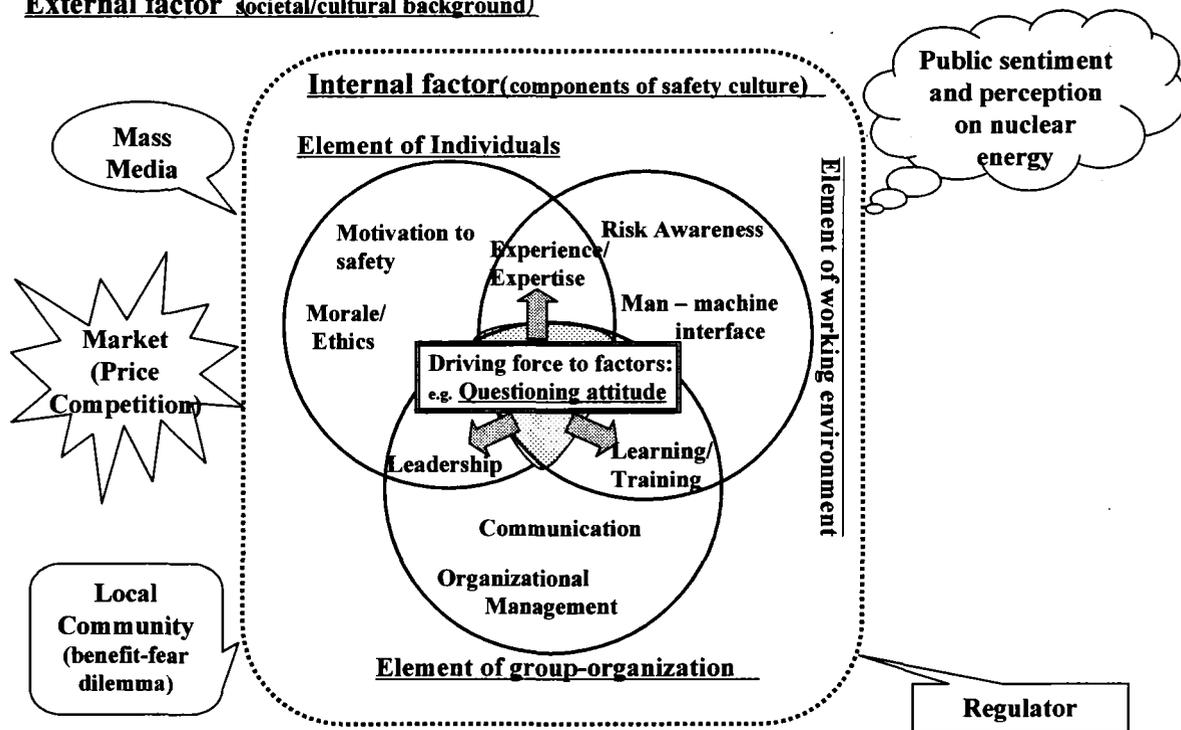


FIG.1. Safety culture composite image model.

For the purpose of improving safety culture, each factor must be activated by driving forces. The result of our interviews and conceptual surveys suggest that one of the most effective driving forces to activate all the component factors is “questioning attitude”. In other words, the situation of questioning attitude among site staff can be regarded as a dominant indicator of safety culture management.

4. Conclusions: next step to manage safety culture model

The image model that we showed in Fig.1 is highly abstracted from actual facts in site. When the image model is applied to safety culture management in nuclear facilities, it must be interpreted in the context of each site. So it is important for us to observe how the model is interpreted and applied in the context of sites. Field research with the methodology of anthropology and sociology are practical in assessing and modifying the applicability of a safety culture component model.

The safety culture model like Fig.1 tends to be considered as static one. On the contrary, safety culture will not remain in regular conditions, but always move from one situation to another. So the model must be thought as a dynamic concept. To understand the dynamism of safety culture, especially the dynamism of an organization and its driving forces, learning from case studies is the most effective method.

Our next step is to conduct case studies on the important accidents that occurred in nuclear, railway, food processing, and other fields on the basis of safety culture composite model. Especially we will analyze how the cultural factors affected on recent accidents and how they depended upon inner or outer organizational contexts.

REFERENCES

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