

## Mechanisms and applications of formatting unsafe behaviour motivation

Yuebing Zhang\* Zhiliang Wang

North China Institute of Science and Technology, East Yanjiao 101601, China  
Foundation item: the fundamental research funds for the Central Universities Fund (3142014014)

### ABSTRACT

This paper aims to reveal the mechanism of work safety behaviours in order to effectively curb various unsafe behaviours. For this, various motivations for unsafe behaviour are analyzed based on the work safety behaviour features, application need, motivation, behaviour theory of psychology, the logic analysis method, and accident cases analysis, as well as the source of need producing the motivations. The results show that the need comes from the source of human behaviour. To improve the level of people's safety needs and to appropriately weaken the level of other needs is the basic measure of preventing unsafe behaviours. The main means to adjust the level of needs is to regulate the imbalance of corresponding conditions. For instance, "on-the-spot meeting for accident investigation" can change the lack and imbalance senses of people's safety conditions and improve the level of safety need.

**KEYWORDS:** unsafe behaviour; need; motivation; accident prevention; safety psychology

### 1. FOREWORD

Productive labor can be considered a process of understanding and changing nature. In this process, each human has experiences countless painful lessons due to error behaviour or "incompetence", such as natural disasters, wars, accidents, and disease. Some of these disasters can be avoided, such as in the field of work safety. Statistics show that more than 90% of accidents are caused by improper human behaviour, and can be considered a "responsibility accident". Each of the 30 major work safety accidents announced during 2007-12-23 to 2012-08-28 in the website of China's State Administration of Work Safety is a responsibility accident (Fu et al., 2013). Theoretical derivation also shows that the vast majority of accidents are people-related (Zhang et al., 2013), either directly due to improper human behaviour, or due to a wrong decision and management. For example, in 2013 the devastating Shandong "11 • 22" Sinopec Dong Huang oil pipeline leakage and explosion accident was attributable to the impact spark produced by the site disposal using hydraulic breaking hammer punching in a culvert cover plate. Similarly, the fatal Babao coal mine gas explosion was triggered by the improper control of coal spontaneous combustion in a mined out area. Therefore, it is of significance for work safety to study the behaviour of humans, analysis, forecast and control human behaviour, both theoretically and practically.

### 2. THE HUMAN BEHAVIOUR MECHANISM

Human psychology is a very complex phenomena. Human psychological activity is expressed through external behaviour, or people's explicit behaviour is controlled by implicit psychological activity. All human behaviours (including unconscious behaviours) are dominated by psychological activities, and in turn, psychological activities are developed and expressed through behaviour (Shao and Wang, 2004).

Psychology thinks that human behaviour is decided by needs and motivation; behind people's behaviour there must be motivation, and motivation comes from the people's need, therefore, the need is the original power of human behaviour (Chen, 2010). However needs do not lead to behaviour directly, but instead act through motivation as the direct cause of human behaviour (Chen, 2010). Motivation is being studied more and more extensively in the education and law fields, such as in studies of learning motivation (Gao et al. 2003) and crime motivation (Chen, 2010). The safety behaviour field has been paid little attention, because no people subjectively expect accidents to occur, and the motivation of unsafe behaviour is indirect (Zhang et al., 2013). Chen suggests in their research on criminal motivation that the occurrence of criminal behaviour should have experienced a process of one passive need and two active direction selections. That is, needs exist in everyone's objectively, with no good or bad. Instead, people can choose by themselves whether or not or by what manner to meet a need according to the objective conditions, thus resulting in the corresponding motivation. People also choose

whether or not to move according to a code of conduct and ethical standards. This theory is also applicable to other behaviours such as safety behaviour.

Psychology says that needs produce the psychological tension state, which is transformed into motivation in a situation where the needs can be met. People are stimulated to engage in certain activities to achieve their objectives. When the objectives are achieved, the needs are met and the psychological tension state is removed.

### 3. THE UNSAFE BEHAVIOUR MOTIVATION ANALYSIS

The transformation of needs into motivation is a very complex process. In general, the actor will weigh the advantages and disadvantages in the decision-making process.

Based on the behaviour model of Chen Hong (2006), the behaviour control model can be proposed as shown in Figure 1. It can be seen that the physiological and psychological aspects of a lack and imbalance always stimulate the person's needs at a certain level (Chen, 2010). This need makes actor selectively sense the environmental information, judge and process the information based on their own experience and knowledge, determine whether conditions exist that can satisfy some need, and then take some kind of behaviour to meet the needs. Hence, the motivation occurs.

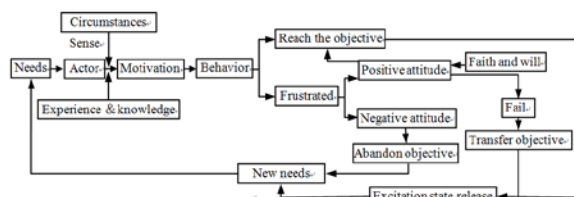


Figure 1: the human behaviour model.

The author argues that whether need is transformed into motivation depends on two aspects: one is the need intensity; the other is the behaviour cost to meet the needs. Human behaviour at first perceives the information of the environment, and then based on the human's knowledge, sends out a response. According to Maslow's theory of hierarchy of need, the needs of people can be divided into five hierarchies, from low to high: Physiological needs, Safety needs, Love and belonging, Esteem, and Self-actualization (Maslow, 1954). However Maslow insists that only the needs at lower levels can be met. Maslow argues that this hierarchy can only be established in the general case. Numerous cases show that society, organizations, and people can adjust the needs level by themselves, such as various

behaviours of laying down one's life for justice. Chen Hehua thinks that need is a kind of lack and imbalance. Therefore, the author considers that the level of need is adjusted artificially or by eliminating this lack and imbalance. For example, in the face of a war or death threat, the lack of living conditions places the survival need at a higher level. Then, morale sets up the ideal to improve Self-actualization.

The actor can perceive the information around situations using the sensory organs. The amount of the information that can be perceived is limited, so perception is selective. Needs at higher levels will prompt the actor to input more attentional resources to the information that can help to meet the related need. At the same time, the strength of the information and whether there are significant differences between the information and others around will also affect the information perception selection. Then, the actor processes the information according to his own experience and knowledge. If he is assured that in this situation, he is able to complete a behaviour, and behaviour results can meet the needs, the actor will feel the motivation to implement the behaviour. Motivation has a clear directivity, and is linked to means of behaviour to meet the need.

Finally, the actor will further think if this kind of behaviour may cause other results, make a trade-off between costs and profit, and determine whether or not to implement this behaviour. If he chooses to implement, but the behaviour fails, the actor may choose to give up or continue to work hard according to the judgment of the task difficulty, and eventually satisfy the need or leave it unsatisfied and cause mental stress. This judgment process, of course, is not always very prudent, due to the complexity of causality or due to time limits. Thus the actor will also show impulse.

#### 4. UNSAFE BEHAVIOUR MOTIVATION ANALYSIS AND PREVENTION COUNTERMEASURES

#### 4.1 Unsafe behaviour motivation analysis

There are many kinds of unsafe human behaviours. Appendix 7 of "The enterprise worker casualty accident classification standards" (GB6441-1986) classifies the unsafe human behaviours into four kinds: first, the ones because of inattention, the individual physiological function defects which cause behaviour mistake; second, the ones because of actors' lack of scientific understanding or the consequences of the behaviour, not knowing the seriousness of the consequences, not knowing the

uncontrollable consequences, or not knowing what behaviour is beyond their ability. This kind of situation sometimes is due to inadequate mastery of environmental information, sometimes due to a lack of experience and knowledge. It can also be due to a lack of serious judgment, namely the paralysis of thought; third, when one knows the possible consequences, but between the positive benefits and possible loss a preference exists to save energy, time or bravado; fourth, because one does not agree with the system. There is no equal information between system makers and system conformance.

From the theory of need-motivation-behaviour, the occurrence of the above unsafe behaviours are all due to the safety needs of the actor. And their organization causes a low-level relative to the other needs.

Generally speaking, in the enterprise's work safety, the physiological need of the actor is usually in a relatively high level, because the enterprise should make profits and the workers should earn salaries, which causes the enterprises to generate the motivation and the behaviour of production, and the workers to generate the motivation and behaviour of finishing tasks. In addition, since fierce market competition leads to the growing shortage of living conditions, the physiological need is in a higher level.

As for safety needs, although they are in an inferior level, considering the conditions for work safety, the actor rarely has an accident or is in distress. Therefore, the lack and imbalance sense of the safety conditions is low, and thus the safety need is in the lower level.

Social needs, esteem needs, and self-actualization needs are in the higher hierarchy. These need levels can be increased because of the corresponding lack and imbalance.

#### *4.2 Preventive measures of unsafe behaviours*

In order to prevent the unsafe behaviour of the people, the fundamental method is to improve the lack and imbalance senses of the safety conditions, and to reduce the lack and imbalance senses of other needs, thus to put the actor's safety needs in a higher level. Only in this way can the actor pay more attention to the work safety, reduce the formation of the motivation and the implementation of the unsafe behaviours. Meanwhile, it can also help employees learn safety knowledge and skills.

##### *(1) Improve the level of safety needs*

To improve the level of the safety needs mainly relies on improving the lack and imbalance senses of the safety conditions. The improvement of this kind of lack and imbalance senses is not to literally reduce the conditions for work safety but to make people feel the seriousness and importance of safety

problems. On-the-spot accident meeting is a good way by which employees feel the seriousness of the safety problems and the accident consequences, thus their lack and imbalance senses of the safety conditions are enhanced. Of course, for the company alone, the accident probability is low, so it is helpful that the company should hold some meetings about the near-miss accident, or play some videos of the accident scene.

##### *(2) Reduce the level of other needs*

Risk-taking is a typical unsafe behaviour. Although it can bring injuries, it give psychological satisfaction and easy profit. It can meet the Physiological needs and Esteem needs. According to this situation, enterprises can cultivate safety culture to form a belief that risk-taking is shameful and that observing discipline is glorious within the enterprise. They can implement activities to satisfy the employees' esteem needs by observing discipline. Meanwhile, to exercise workers' stamina and endurance, they should reduce the labor intensity and time, thus to lessen the lack and imbalance senses of fatigue and the level of physiological need.

The performance of violation conformity sometimes is to meet the Love and belonging needs. For example, under circumstances where others are not wearing a seat belt, the actors tend not to wear one either. Enterprises can solve the above problems by strengthening the communication among the employees and enhancing the independence of safety behaviour through publicity of public opinion.

Organizational citizenship behaviour exists to satisfy the Self-actualization needs. These "extra tasks" sometimes are beneficial for safety, and sometimes not. For example, three women in Jilin Province managed to stop a train and prevented a major traffic accident, but conversely, the collieries removal of a miner's lamp may lead to a gas explosion.

The actor here means decision-maker, management, or executive. For the decision-maker, making decisions is their behaviour, like decisions concerning work safety investments and safety measures. The nuclear field offers many examples of how "external" errors or omissions have been significant contributing factors to accidents (Mosey, D. 2014). As for the management, their behaviours are planning, implementing, checking and improving the system, crystallizing, detailing, programming the final policy, and implementing it. They must arrange for someone to do some tasks, prepare materials and equipment, coordinate among different departments, and set up effective control systems like checking and supervising behaviours and correcting them. As for the executives, they need to execute the tasks given by the management according to the relevant

regulations. Obviously, these behaviours are influenced by the need level of the actors. Enterprises should strengthen publicity, establish the values of being people-oriented, and improve the level of safety needs to reduce the acceptable level of risks. Meanwhile, to make the management realize the expectations from the grassroots, the grassroots should know the management's policy. Effective communication is a prerequisite that is necessary for the improvement of the safety needs level, and the value everyone places on safety.

## 5. CONCLUSIONS

No behaviours can exist without motivations, and needs are the source of behaviours. It is of theoretical and practical significance for the prevention of work safety accident to study the mechanism of the theory of need-motivation-behaviour.

To prevent the unsafe behaviours of the people, the fundamental method is to put the actors' safety needs in a higher level. Only in this way can the actors pay more attention to the work safety, actively learn the safety knowledge and skills, reduce the formation of the motivation and the implementation of the unsafe behaviours.

In order to improve the level of the safety needs, one must mainly improve the lack and imbalance sense of the safety conditions, and reduce the lack and imbalance sense of life conditions, social conditions, esteem condition and self-actualization conditions. Methods include having meetings at the scene of accidents, increasing the employees' income, exercising workers' stamina and endurance, reducing the labor intensity and time, enhancing communication between the staff, and establishing the right values. All these measures can change the neediness and the sense of imbalance.

## 6. REFERENCE

- CHEN He-hua. (2010). Origin, Character and Formation of Criminal Motivation. *Journal of Political Science and Law*, Volume 2, pp. 21-27.
- CHEN Hong. (2006) Research on unsafe behaviors of coalmine fatal accidents in China. Beijing : Science Press, pp. 122-141.
- FU Gui, YAN Wen-tao, DONG Ji-ye, et al. (2013) Behavior-based accident causation: the "2 - 4" model and its safety implications in coal mines. *Journal of China Coal Society*, Volume 7, pp. 1123-1129
- GAO Yi-hong, ZHAO Yuan, CHENG Ying, et al. (2003) Motivation Types of Chinese College Undergraduates. *Modern Foreign Languages*, Volume 1, pp. 28-38.

GB6441-1986, Standard for classification of casualty accidents of enterprise employees, National standard of the people's Republic of China.

Maslow, A (1954). *Motivation and personality*. New York, NY: Harper. p. 236. ISBN 0-06-041987-3.

Mosey, D. (2014), Looking beyond operator, NEI Magazine, <http://www.neimagazine.com/features/featurelooking-beyond-the-operator-4447549/>

SHAO Hui, WANG Kaiquan. *Safety psychology* (2004). Chemical Industry Press, 65p.

ZHANG Yue-bing, WANG Kai, WANG Zhi-liang (2011). Theoretical research on hazards and its application in accident prevention. *China Safety Science Journal*, Volume 21, pp. 10-16

ZHANG Yue-bing, ZHANG Chao, WANG Zhi-liang. (2013). Research on Safety Behavior Features and Its Application. *China Safety Science Journal*, Volume 7, pp. 3-7.