MONASH University
Business and Economics

OCCUPATIONAL SAFETY IN CHINA: POSSIBLE CONTRIBUTIONS FROM THE FIELDS OF SAFETY CULTURE AND SAFETY CLIMATE

Clissold, G., Fu, G. & Zhu, C.J.

Working Paper 27/06
August 2006

DEPARTMENT OF MANAGEMENT
WORKING PAPER SERIES
ISSN 1327–5216

Abstract

The low standard of occupational safety in China is an issue of human rights and is an ethical concern at an international level. No country in history has industrialised at the same rate as China has over the past 20 years. This focus on production is reflected not only in the national culture, but also the organisational culture of Chinese businesses. Whilst it is important to appreciate China's developmental goals, it is necessary to achieve more balance between production and safety. This paper presents a review of occupational safety combining the research conducted in developed countries with the state of occupational safety in China. As a result of this review, it is argued that whilst a focus on legislation, regulation, and technology are vital, so to is the development of an understanding of safety culture and safety climate at the national and organisational level in China. The literature reviewed in this paper suggests that while China recognises the importance of such concepts their research agenda does not support such a focus.

This paper is a work in progress. Material in the paper cannot be used without permission of the author.

OCCUPATIONAL SAFETY IN CHINA: POSSIBLE CONTRIBUTIONS FROM THE FIELDS OF SAFETY CULTURE AND SAFETY CLIMATE

INTRODUCTION

During the 1990's in China, there was an average of 100,000 fatalities from industrial accidents (Li, 2005). Whilst the notion of occupational safety is certainly not new in China, the issue of protecting workers in Chinese workplaces is becoming increasingly prominent at an international level, prompting the Chinese government to take action with respect to occupational safety (Su, 2003). However, there remain a range of issues that must be addressed if standards in occupational health and safety are to improve in China.

Shan Chunchang, a Deputy Director in the department of State Administration of Work Safety (SAWS) stated in an article published in China Youth Daily (2002 as cited in Pringle & Frost, 2003: 309) that despite the presence of legislation "the absence of rigor and the failure of implementation" has prevented the improvement in occupational safety in China. More recently, Mr Li Yizhong, the Director General of The State Administration of Work Safety (SAWS), has proposed a new strategy for China's work safety management with a specific focus on safety culture and safety climate. However, as stated by Pringle and Frost (2003) and reflecting on the comment made by Shan Chunchang, the problem with such ideas lies in the gap between understanding what needs to be done theoretically and the process of converting the concepts to practice. Further, a lack of research on the state of safety within China limits the applicability of theory, such as that associated with safety culture and safety climate, to the Chinese context. Our understanding of the effectiveness of creating a safe culture or safe climate is ensconced in the country culture of Australia, the United States, and the United Kingdom. The nature of the labour market and the characteristics of work organisation in China are not comparable to such developed economies. Brown (2003) made comparisons between the state of labour relations in China with the early days of the industrial revolution in Europe and the early appearance of capitalism.

The aim of this paper is to review the current state of occupational safety in China. Further, this paper will argue that current knowledge in the field of safety culture and safety climate has much to contribute in terms of improving occupational safety in China. However, it is important to consider how applicable existing definitions of safety culture and safety climate are, given their orientation in developed countries. As such, it is critical that safety culture and safety climate be considered within the unique context of China's national culture and economy. Through exploring the application of the safety culture and safety climate terms within the Chinese context, it is hoped that more appropriate strategies for the improvement of occupational safety in China can be provided.

This paper will be dissected into four sections. First, it is important to understand occupational health and safety from a global perspective. Different countries have reached different stages in the evolution of labour relations, production patterns, and, by association, occupational health and safety. It is important to acknowledge this. The global context also draws attention to the links between sociological and economic perspectives and occupational health and safety, which are discussed the second section of this paper. The third section will review the current literature on occupational safety in China with a focus on possible ways forward with respect to improving occupational safety in China. This part of the review will be illustrated by a case study. The final section will define and review the safety culture and safety climate concepts, while also providing support for the applicability of such concepts to the Chinese situation.

At this point it is also important to note the distinction made here between occupational safety and occupational health. Occupational safety refers to the perception of risk attached to the nature of work and production. No situation or environment can be absolutely free of risk and therefore can not be 100% safe. However, occupational safety refers to the management of the amount of risk in the workplace, as well as the value placed on that risk (Taylor, Easter, & Hegney, 1996).

Occupational health, broadly, is an absence of disease. The focus in occupational health is on healthy organizations which refers to a state of complete physical, mental, and social well-being (Tetrick & Quick, 2003). In the first section of this paper reference will be made to both health and safety. However, in the second section, the review of the current situation in China, the focus will be on occupational safety. The breadth of literature attached to each field is too broad to allow for a review of both within the scope of this paper.

THE GLOBAL CONTEXT FOR OCCUPATIONAL SAFETY RESEARCH

The improvement of health and safety standards within the organizational context is an issue of global concern. At the International Commission on Occupational Health (ICOH) 2003 Congress, it was reported that current International Labor Organization (ILO) statistics estimate that in the year 2000, there were between 1.9 and 2.3 million work-related deaths worldwide (Takala, 2003). At the National level occupational health and safety standards are interconnected with the state of the national economy and as such, changes in economies impact health and safety statistics (ILO, 2003; Tetrick & Quick, 2003).

In developed countries the standards of technology, engineering, mechanization, policy and legislation provide relatively high levels of protection for workers. In developing countries, such standards are often not inherent in the nature of work and systems of production. ILO estimates suggest that in developing countries, for example parts of the Middle East and Asia, injury rates are approximately four times those of European countries (Takala, 2002). In developing countries a lack of infrastructure, the pressure to compete internationally, and increase levels of development has contributed significantly to both the rate and nature of injury and illness experienced (ILO, 2003).

The ILO has targeted the development of occupational health and safety standards since its inception in 1919 (ILO, 2004b). Kofi Annan, Secretary General of the United Nations, (as cited in Takala, 2002) stated that it is the right of every human, regardless of their employment status or wage to have access to safe working conditions, and to have both the skills, resources and 'permission' to protect themselves at work. As such, the ILO positions their Safe Work program under the broader Decent Work Agenda, which focuses on rights at work, employment, social protection and social dialogue (ILO, 2004a; Takala, 2002). The three aims of the Safe Work program are to a) increase awareness of the causes and outcomes of occupational injury, illness and disease, b) promote minimum standards of protection for workers internationally and c) to disseminate information to increase the capabilities of national groups to proactively manage occupational health and safety (ILO, 2004a).

In conjunction with the ILO's Safe Work program the Global Strategy on Occupational Safety and Health was developed as a result of the 91st Session of the International Labor Conference. The Global Strategy outlines a set of conclusions the ILO hopes will inform occupational health and safety activities at the enterprise, national and global level (ILO, 2004b). Such conclusions include consideration of the socio-economic context of occupational health and safety, increased general awareness and the creation of a national OHS agenda as well the creation of preventative health cultures and safety cultures at the national and enterprise level (ILO, 2004b).

UNDERSTANDING OCCUPATIONAL SAFETY FROM A SOCIOLOGICAL AND ECONOMIC PERSPECTIVE

The sociological approach to occupational safety addresses the problem of occupational injury and accidents by attributing much of the explanation to societal causes. One aspect of the sociological approach posits that occupational injury can be explained as an outcome of the distribution of power, money or other resources within either society generally, or the organization specifically (Bohle & Quinlan, 2000; Peterson, 1999). Other sociologists research occupational safety as an outcome of the organization of work and life more generally. Characteristics of work that are considered to contribute to occupational injury and accidents include work hours, shift work, payment methods, overtime payments, patterns of communication and authority (Bohle & Quinlan, 2000; Dwyer, 1983). The sociological approach to occupational safety also posits that negative safety outcomes can also be considered as a function of life and more specifically quality of life, quality of work life, the expectations and pressures of life (i.e., financial wealth and ownership of goods) and also the interaction between work and non-work elements of life (Greenwood, 1991).

Williams (1993) argues that, historically, the sociological approach to occupational safety has focused on theories associated with production and class issues. This Marxist-dominated argument relates to the imbalance between the production and protection characteristics of capitalist society (Berger, 1999; Green, 1997). Such a supposition, however, has been argued to be flawed because of the presence of significant occupational safety issues within socialist economies (Bohle & Quinlan, 2000). Issues of inequality, however, are relevant to occupational safety research and have been addressed by the ILO, in the context of differential power and resource distribution between countries (Takala, 2002). The ILO reports that certain groups within industrialized countries' occupational safety are being pushed further towards societal margins resulting in increased injury and fatality rates. In developing countries, standards of occupational safety are a minor concern compared with the push for development (ILO, 2003, , 2004b).

The economic approach is concerned with developing balance between the costs and benefits of injury prevention to the organization and the community as a method of promoting the protection of workers (Peterson, 1999). The cost of occupational injury to the Australian workplace is approximately $A30 billion per year (Ellis, 2004, April 28). The emphasis in contemporary occupational safety literature is that the safer the organization, the more productive it will be. Safe organizations spend less money on insurance premiums, workers compensation, replacing injured workers and litigation. The central argument of the ILO in promoting occupational safety programs is that the provision of decent work is not only socially responsible but is also economically beneficial (Takala, 2002).

Shifts in the economies of developed countries significantly impact the nature and types of work, which in turn impacts on occupational safety. Quinlan (1999) suggests that the increasing number of shift and night workers, the trend toward outsourcing, and the increasing number people employed in temporary, casual, contract or part-time positions impacts occupational safety by increasing injury rates. Precarious employment and other characteristics of industrialized economies such as restructuring, reengineering and outsourcing have also been shown to increase injury rates (Probst, 2002; Probst & Brubaker, 2001; Quinlan, Mayhew, & Bohle, 2001). Further, the shift away from mining and manufacturing to knowledge and service based industries, has impacted on occupational safety in terms of a decreased focus on physical injury and an increased focus on more psychological and psychosocial hazards (Tetrick & Quick, 2003).

Economic changes and the resulting changes to the labor market are the result of the pressure put on contemporary organizations to remain competitive within a global economy. On the shopfloor, supervisors express concern for issues of occupational safety but acknowledge that such concern is often outweighed by the need to meet production expectations (Berger, 1999). Due to the push for production, researchers have identified cases where injuries go unreported, supervisors 'turn a blind eye' and unsafe practices continue because of the drive to make profits and a lack of employee control (Berger, 1999; Mayhew & Quinlan, 1999; Quinlan, 1999). Although some of the characteristics of work or employment may be out of control of a specific organization or even a country, the safety culture can be improved to facilitate resources distribution, which makes positive impacts to occupational safety.

OCCUPATIONAL SAFETY IN CHINA

The rate of industrial accidents in China poses a serious threat to its continued economic and social development, particularly considering the prominent position of social responsibility on the world stage (Liu, Zhong, & Xing, 2005). China is argued to be fast becoming the factory floor of the global economy (Brown, 2003). Seventy percent of the world's toys, 40% of the microwave ovens, 40% of the sports shoes, and 70% of the photocopies are produced in China. China is now the fifth largest trading nation in the world behind the United States, Japan, Germany, and France (Brown & O'Rourke, 2003).

By the end of 2001 the population of China had reached 1.27627 billion people, with 720.25 million employed accounting for 77.03% of the total labor force. The employment structure in China has shifted dramatically since the late 70's. The proportion of people employed in primary industry has dropped dramatically, while those employed in secondary and tertiary industries has increased. In 1978, 99.8% of all urban employees were employed in state or collective enterprises. In 2001, this figure had dropped to 37.3% with the number of employees of private, individually owned, and foreign-invested enterprises continuing to climb (Su, 2003).

The rapid pace of development in China's economy has been based primarily on low wages, extremely long work hours, and the stability of the political context. Many of the factory workers in China are predominantly young females who have migrated from rural areas to urban areas to work in factories. These workers are often inexperienced and uneducated with respect to the workforce and are also limited by the fact that they often speak a different dialect. Further, many migrants have to pay for expensive permits to be able to live and work in urban areas, a price that leaves the individual with debit, and effectively commits them to work, despite work conditions (Brown, 2003).

In addition to the many hazards associated with factory work, coal mines account for the most significant portion of industrial deaths in China. The SAWS has classified industrial accidents in China into three groups; coalmine accidents, metal and non-metal mine accidents, and accidents in industrial and commercial enterprises (Liu et al., 2005). In 2003, 6434 deaths occurred in coalmines, constituting 37.16% of the total industrial deaths (Liu et al., 2005). There are three major forms of coalmines in China, i.e., major state-owned coalmines funded by the state, local state-owned coalmines funded by local government, and township or village owned coalmines (Liu et al., 2005). While the state-owned mines are often considered safer than the township or village enterprises (Wright, 2004), in the four months at the end of 2004 and the beginning of 2005, coalmining accidents in state-owned mines killed 528 people (SAWS, 2005). Statistics indicate that fatalities per million of tons of raw coal mined is 100 times that of the united States, 30 times that of South Africa, and 10 times that of India (Zhao, 2004).

There has been a paucity of research on occupational safety in China, regardless of industry (Brown, 2003; Brown & O'Rourke, 2003). The research that has been conducted overwhelming points to the imbalance between economic development and worker protection as being a primary cause of industrial accidents (Brown, 2003; Wright, 2004). However, steps in improving occupational fatality and injury rates are being made (Wright, 2004; Zhong et al., 2004).

Recognizing the lack of academic research, it is important to assess the gaps in the extant literature. In the next section a case study of a Chinese coalmining accident will be considered. In order to understand occupational safety and develop research that is appropriate in addressing occupational safety problems, it is important to understand how accidents occur. Research on occupational safety in China has resulted in suggestions for 'a way forward'. These suggestions will be considered in conjunction with the case study. China's current strategies for research and development in relation to occupational safety will also be considered, with respect to the way in which safety culture and safety climate research can fill gaps in such a research program.

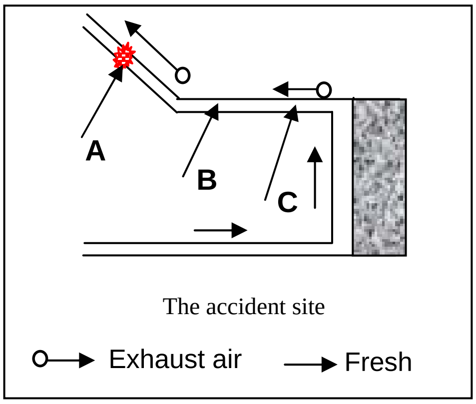
CASE STUDY: SUNJIAWAN MINE

Accident investigations are central to occupational safety research. Hofmann and Stetzer (1998) argue that if organizations are to achieve change and improvement in occupational safety, the underlying causes of accidents must be identified. In order to identify these causes, accident investigations must be considered. However, there is very little available information, in English, on accident causation in China. It is important to consider how accidents happen in China so that the applicability of concepts such as safety culture and safety climate can be determined. From an applied perspective it is only appropriate to consider concepts such as culture and climate in countries where the majority of other avenues for improvement (e.g. technology, mechanization, legislation) are extensively employed. Many countries have not reached such a stage in the evolution of occupational safety standards and it is important to consider China's position in such a process.

At the beginning of 2005 a gas explosion occurred at Sunjiawan Mine, which is an underground coal mine. Two hundred and fourteen miners were killed as a result of this disaster ("At least 203 killed, 22 injured in Liaoning coal mine blast," 2005).

Sunjiawan Mine is part of the Fuxin Mining Group, one the biggest mining companies in China. The Fuxin Mining Group produces approximately 10 megatons of raw coal each year, and has 45,000 full time employees. The capacity of the Sunjiawan Mine is 1.5 mega-tons. At the time of the accident, the Sunjiawan Mine was restructuring its management and production systems, increasingly moving toward a system whereby all production activities, including occupational safety, were contracted out (*Sunjiawan Mine*). In the following section the events leading up to the accident will be outlined. Figure 1 is used to support this discussion.

Figure 1: Sunjiawan Mine (*Sunjiawan Mine*)



Position A (see Figure 1) is the point at which the initial explosion occurred. The explosion occurred due to a build-up of methane gas and a spark. Methane built up in the area because the exhaust fan at point C, which was designed to run continuously to provide fresh air to the miners and to prevent the build-up of poisonous and explosive gases, was not in operation. The second cause was strata movement at point B, which resulted in the production of methane. Because the fan wasn't working the methane levels in the air reached explosive levels, between 5% and 16%. At this point in time, contract workers, without work permits, were working at point A. The workers failed to switch off the electricity while fixing the protector for a light signal. Sparks were produced and in the methane rich environment, an explosion occurred (*Sunjiawan Mine*).

As is the case in many industrial accidents of both the 20th and 21st century, industrial disasters are a consequence of the environment in which the workers are operating. For instance, a lack of preparation and experience in fission, engineering changes post plant construction and the complexity of systems and technology have been determined to have contributed to the potential disaster at Three Mile Island (Perrow, 1984). In the situation at Bhopal, low employee morale, resulting from profit losses, the threat of divestment, labor-management conflicts, high turnover of the most skilled staff and a lack of career opportunities resulted in a careless attitude toward organizational operations (Shrivastava, 1987). Accident investigation has revealed that the catastrophe at Chernobyl was caused by the pressure placed by management on experimentalists to complete the experiment, stress and technological complexity (Mould, 1988). And finally the Tenerife Air Disaster was caused by communication problems, strict and perhaps inappropriate rules and predominantly stress (Weick, 1990).

In the Chinese context the cause of accidents such as that at Sunjiawan Mine are numerous, with the Sunjiawan Mine being a relatively typical example of accidents in Chinese organisations, and coal mines more specifically. Analysis of these causes is summarized by a range of authors. At a macro level Wright (2004) argues that accidents are caused by the political economy. Pringle and Frost (2003) have cited the need for more rigor and strength in the implementation of legislation. O'Rourke and Brown (2003) cited the need for transparency, verification in terms of self-monitoring and government inspections, accountability and responsibility for occupational safety from multinational corporations and government agencies, and the strengthening of worker participation. Szudy, O'Rourke and Brown (2003) also emphasise the importance of greater worker participation in the improvement of occupational safety, in conjunction with clear guidelines for the multiple stakeholder groups, obtaining management commitment, building the employees capacity to participate, involving various groups with technical expertise, and finally connecting the goals of the enterprise with those of the country and global economy.

Of particular interest here is the focus on the need for self-regulation, a strategy through which employees are involved and are able to participate, and management commitment. It is the argument here, therefore, that not only is safety culture and safety climate relevant within Chinese industry, but that the terms present one of the best strategies to obtain these desired outcomes. Also important here is the need to shift the research focus to safety culture and safety climate in China. In the next section the occupational safety research agenda in China will be discussed, with specific reference to the priority given to safety culture and safety climate.

OCCUPATIONAL SAFETY RESEARCH AGENDA IN CHINA

Safety-related research and development in China is currently funded by the Natural Scientific Foundation of China (NSFC), the Ministry of Science and Technology (MST), and private firms. The NSFC funds research activities on an annual basis, supporting researchers from research organizations, educational institutions and other organizations The NSFC choses only 20-25% of the applicants through a competitive process of peer-review. In searching the NSFC database for the key words 'mine', 'safety', 'coal', between the years 2000 and 2004, 67 related projects were found to be funded by the NSFC.

The MST, only funds large scale projects on a 5-year basis, with researchers generally being selected and invited to be involved by the target industrial governmental departments. Generally, each industry is funded only a limited number of projects and in many cases only one. These projects are then divided into smaller sub-projects undertaken by a research group with the specific research expertise. In MST's 10th 5-year funding plan from 2000 to 2004, only one safety-related large project, with 17 smaller associated sub-projects, was funded.

Privately or organisationally funded projects are research-firm negotiation based projects, are not regularly public listed. This type of project generally takes the form of a consulting project, aiming to develop immediate solutions for the safety problems existing in the investing firm. These types of projects are among the largest number of total safety related research/consulting projects, but it is difficult to get the accurate statistical data both in the number of projects or contents of the projects. Many of the firm-funded research projects are established and concluded within a small number of weeks.

For those projects that are funded by a source listed above, it is very common for project leaders to apply for SAWS rewards and acknowledgement. In this case, all the three types of projects are equally assessed and evaluated together, and about half of them with quality research outcomes will be rewarded a certificate or prize. From the rewarding project lists, the specific research fields related to safety for the projects can be roughly recognized. The rewarded projects, of course, cover NSFC, MST and business firm funded projects. In 2004, SGWAS totally awarded 69 projects, which were finished during the period of 2000 to 2004. Table 1 lists the projects funded by different organizations, and Table 2 an analysis of the project focus.

Table 1 outlines the distribution of research and development funds within the various research themes. Table 2 shows that in a five year period from 2000 to 2004, 81% of the projects funded by NSFC were engineering focused. One hundred percent of the MST projects were engineering focused, while 83% of the SAWS awards were engineering focused. It is quite clear that over the past 5 years in China, approximately 80% of all research and development funds have been committed to engineering focused solutions to safety problems. Because research and development activities are a key source of information in accident prevention strategies, it is also clear that there is a considerable gap in the research that is informing occupational safety improvement strategies in China. An increase focus on safety culture and safety climate at the state and enterprise level in China is a strategy that has the capacity to make significant and focused improvements in occupational safety performance.

Table 1: Occupational safety research and development funding

Research theme	**Focus**	**Funded by**		**Awarded by**
		NSFC	**MST**	**SAWS**
Gas control	E	18	17	6
Fire control	E	8	0	6
Strata Control	E	18	0	9
Water control	E	6	0	8
Dust control	E	0	0	3
Ventilation	E	2	0	3
Mechanical and electrical safety	E	2	0	11
Heat control	E	0	0	1
Info Tech	E	0	0	10
Risk assessment	RM&PB	4	0	4
Medical	RM&PB	0	0	1
Insurance	RM&PB	0	0	1
Management, organization	RM&PB	2	0	4
Psychological and Human factors	RM&PB	7	0	2
Total	-	67	17	69

Note: E-engineering, RM&PB - risk management and person based themes

Table 2: Thematic distribution of funding

Funded by	**NSFC NO.**	**%**	**MST NO.**	**%**	**SAWS NO.**	**%**
E Focused Projects	54	81	17	100	57	83
RM&PB Projects	13	19	0	0	12	17
Total	67	100	17	100	69	100

Note: E-engineering, RM&PB - risk management and person based themes

DEFINING SAFETY CULTURE AND SAFETY CLIMATE

Safety culture and climate are concepts that have been developed to provide both researchers and practitioners with a framework for the assessment of safety within the organization. Culture is defined by Schein (1985) as constituting three integrated levels of analysis: basic assumptions, espoused values and artifacts. The climate concept occurs at the level of espoused values and encompasses attitudes, beliefs and perceptions. Schein (1985) argues that climate precedes culture and that through the study of attitudes, cultural assumptions are reflected. Further to this, Guldenmund (2000) argues that "… culture expresses itself through …climate." Within the context of safety literature, safety climate represents the attitudes of the individual towards safety, hence providing a manifestation of safety culture. Stemming from the climate theory previously discussed therefore, safety climate is formed through the individual's interaction with his/her environment and specifically the safety-specific characteristics of their organizational environment (Schneider & Reichers, 1983; Weyman, Clarke, & Cox, 2003). Through this process the individual develops perceptions, attitudes and beliefs about organizational safety, which combine to form the safety climate. A key element in this process is the way in which these attitudes, perceptions and beliefs correspond with the organizational safety culture (Hopkins, 1999; Moran & Volkwein, 1992).

Safety climate is becoming increasingly dominant in safety research. Logically and theoretically the argument that safety-related perceptions and attitudes of people within the organization will predict or impact the 'safeness' of their behavior is sound. This relationship has also been confirmed through empirical research (Cox & Cox, 1991; Coyle, Sleeman, & Adams, 1995; Griffin & Neal, 2000; Zohar, 1980). The safety climate concept is an extremely valuable research and management tool. Coyle et al. (1995) stated that safety climate measures are important to the development of effective management strategies. They further argue that despite the lack of stability and agreement on the measures used in research, climate measures are a valuable proactive tool for planning and managing organizational safety. Safety climate provides not only a starting point for determining 'good' and 'bad' or 'low accident' and 'high accident' organizations (Cohen, 1977) but also enables safety to be mapped over time as it improves, therefore providing an indication of the value of safety interventions (Lee, 1998).

Despite espousing the importance of research into safety culture and safety climate through SAWS, the distribution of research money in China still focuses very much on engineering and technology based controls. This focus, whilst important, only has the capacity to address a portion of the research problem.

CONCLUSION

Whilst in the past it has been difficult to obtain an accurate 'picture' of occupational safety in China, the evidence that is emerging suggests that injury and fatality rates in Chinese factories and mines are at an unacceptable level. Whilst the Chinese government has been striving to change this record, the push for economic development remains the dominant motivating force. However, the Chinese government, and specifically SAWS, has acknowledged the need for an increased focus on organisational safety culture and safety climate. If such a move forward is to be made it is necessary for government groups to include more humanistic, management, and organisational design themes in the country's research agenda. Such research is critical in the improvement of occupational safety in a country experiencing change as unique as that which is occurring in China.

REFERENCES

At least 203 killed, 22 injured in Liaoning coal mine blast. (2005). *China Daily*.

Berger, Y. (1999). Why hasn't it changed on the shopfloor? In C. Mayhew & C. L. Peterson (Eds.), *Occupational health and safety in Australia: Industry, public sector and small business* (pp. 52-64). St Leonards, NSW Allen & Unwin.

Bohle, P., & Quinlan, M. (2000). *Managing occupational health and safety: A multidisciplinary approach* (2nd ed.). Sydney, NSW: Macmillan.

Brown, G. D. (2003). China's factory floors: An industrial hygienist's view. *International Journal of Occupational and Environmental Health, 9*(4), 326-339.

Brown, G. D., & O'Rourke, D. (2003). The race to China and implications for global standards. *International Journal of Occupational and Environmental Health, 9*(4), 299-301.

Cohen, A. (1977). Factors in successful occupational safety programs. *Journal of Safety Research, 9*, 168-178.

Cox, S., & Cox, T. (1991). The structure of employee attitudes to safety: A European example. *Work and Stress, 5*, 93-106.

Coyle, I. R., Sleeman, S. D., & Adams, N. (1995). Safety climate. *Journal of Safety Research, 26*, 247-254.

Dwyer, T. (1983). A new concept of the production of industrial accidents: A sociological approach. *New Zealand Journal of Industrial Relations, 8*, 147-160.

Ellis, J. (2004, April 28). *Where's the outrage over workplace deaths?* Retrieved 28th January, 2005, from http://www.theage.com.au/articles/2004/04/27/1082831566639.html?from=storyrhs

Green, J. (1997). *Risk and misfortune: The social construction of accidents*. London: UCL Press.

Greenwood, T. H. (1991). *Safety, work, and life*. Des Plaines, IL: American Society of Safety Engineers.

Griffin, M. A., & Neal, A. (2000). Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge and motivation. *Journal of Occupational Health Psychology, 5*, 347-358.

Guldenmund, F. W. (2000). The nature of safety culture: A review of theory and research. *Safety Science, 34*, 215-257.

Hofmann, D. A., & Stetzer, A. (1998). The role of safety climate and communication in accident interpretations: Implications for learning from negative events. *Academy of Management Journal, 41*, 644-657.

Hopkins, A. (1999). *Managing major hazards: The lessons of the Moura Mine Disaster*. Sydney, NSW: Allen and Unwin.

ILO. (2003). *Safety in numbers: Pointers for a global safety culture at work*. Retrieved 11 November, 2004, from http://www.ilo.org/public/english/protection/safework/worldday/report_eng.pdf

ILO. (2004a). *Decent work: The theme in brief*. Retrieved 19 August, 2004, from http://www.ilo.org/public/english/bureau/integration/decent/index.htm

ILO. (2004b). *Global strategy on occupational safety and health*. Retrieved 28 January, 2005, from http://www.ilo.org/public/english/protection/safework/globstrat_e.pdf

Lee, T. (1998). Assessment of safety culture at a nuclear reprocessing plant. *Work and Stress, 12*, 217-237.

Liu, T., Zhong, M., & Xing, J. (2005). Industrial accidents: Challenges for China's economic and social development. *Safety Science, 43*, 503-522.

Mayhew, C., & Quinlan, M. (1999). The effects of outsourcing on occupational health and safety: A comparative study of factory-based workers and outworkers in the Australian clothing industry. *International Journal of Health Services, 29*, 83-107.

Moran, E. T., & Volkwein, J. F. (1992). The cultural approach to the formation of organizational climate. *Human Relations, 45*, 19-47.

Mould, R. F. (1988). *Chernobyl: The real story*. Sydney, NSW: Pergamon.

O'Rourke, D., & Brown, G. D. (2003). Experiments in transforming the global workplace: Incentives for and impediments to imporving workplace conditions in China. *International Journal of Occupational and Environmental Health, 9*(4), 378-385.

Perrow, C. (1984). *Normal accidents*. New York: Basic Books.

Peterson, C. (1999). Perspectives in occupational health and safety. In C. Mayhew & C. L. Peterson (Eds.), *Occupational health and safety in Australia* (pp. 93-104). Sydney, NSW: Allen and Unwin.

Pringle, T. E., & Frost, S. D. (2003). "The absence of rigor and the failure of implementation": Occupational health and safety in China *International Journal of Occupational and Environmental Health, 9*(4), 309-316.

Probst, T. M. (2002). Layoffs and tradeoffs: Production, quality, and safety demands under the threat of job loss. *Journal of Occupational Health Psychology, 7*, 211-220.

Probst, T. M., & Brubaker, T. L. (2001). The effects of job insecurity on employee safety outcomes: Cross-sectional and longitudinal explorations. *Journal of Occupational Health Psychology, 6*, 139-159.

Quinlan, M. (1999). The implications of labour market restructuring in industrialized societies for occupational health and safety. *Economic and Industrial Democracy, 20*, 427-460.

Quinlan, M., Mayhew, C., & Bohle, P. (2001). The global expansion of precarious employment, work disorganization, and consequences for occupational health: A review of recent research. *International Journal of Health Services, 31*, 335-414.

Schein, E. H. (1985). *Organisational culture and leadership: A dynamic view*. London: Jossey-Bass.

Schneider, B., & Reichers, A. (1983). On the etiology of climates. *Personnel Psychology, 36*, 19-39.

Shrivastava, P. (1987). *Bhopal: An anatomy of a crisis*. Ballinger: Cambridge.

Su, Z. (2003). Occupational health and safety legislation and implementation in China. *International Journal of Occupational and Environmental Health, 9*(4), 302-308.

Sunjiawan Mine Retrieved 15 December, 2005, from http://www.chinasafety.gov.cn/zhengwuxinxi/2005-05/13/content_97017.htm

Szudy, B., O'Rourke, D., & Brown, G. D. (2003). Developing an action-based health and safety training project in southern China. *International Journal of Occupational and Environmental Health, 9*(4), 356-365.

Takala, J. (2002). *Introductory report: Decent work-safe work*. Geneva: International Labour Office.

Takala, J. (2003, 23-28 February). *Safety, health and equity at work.* Paper presented at the ICOH 2003 Congress, Iguassu Falls, Brazil.

Taylor, G., Easter, K., & Hegney, R. (1996). *Enhancing safety: An Australian workplace primer*. Perth: TAFE publications.

Tetrick, L. E., & Quick, J. C. (2003). Prevention at work: Public health in occupational settings. In J. C. Quick & L. E. Tetrick (Eds.), *Handbook of occupational health psychology* (pp. 1-17). Washington: American Psychological Association.

Weick, K. E. (1990). The vulnerable system: An analysis of the Tenerife Air Disaster. *Journal of Management, 16*(3), 571-593.

Weyman, A., Clarke, D. D., & Cox, T. (2003). Developing a factor model of coal miners' attributions on risk-taking at work. *Work and Stress, 17*, 306-320.

Williams, C. (1993). Class, gender and the body: The occupational health and safety concerns of blue collar workers in the South Australian timber industry. In M. Quinlan (Ed.), *Work and health: The origins, management and regulation of occupational illness* (pp. 57-91). Melbourne: Macmillan Education.

Wright, T. (2004). The political economy of coal mine disasters in China: "Your rice bowl or your life". *The China Quarterly, 179*, 629-646.

Zhao, T.C. (2004). from http://www.chinasafety.gov.cn/anquanjianguanjiancha/2004-05/27/content_9934.htm

Zhong, M., Weicheng, F., Liu, T. M., Zhang, P. H., Wei, X., & Liao, G. X. (2004). China: Some key technologies and the future developments of fire safety science. *Safety Science, 42*, 627-637.

Zohar, D. (1980). Safety climate in industrial organizations: Theoretical and applied implications. *Journal of Applied Psychology, 65*, 96-102.