

## **A Framework of Safety Culture for the Malaysian Construction Companies: A Methodological Development**

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### **ABSTRACT**

This research presents the methodological development of a framework for promoting safety culture for the Malaysian construction companies. There is no framework that has that been established in this context. The development will enable professionals to quantify and analyze safety culture in a consistent manner. A mixed methodology of qualitative and quantitative was adopted, in which sample for the study was limited to selected building contractors (Grade 7) in the Klang Valley. The preliminary survey identified leadership, organisational commitment, management commitment, safety training, and resource allocation as practices which embed safety culture into organisational culture. Hence, the development of the main survey includes the identification of these behavioural factors and their further expansion to include the aspects of psychological and situational factors' characteristics. Semi-structured interviews were also conducted to provide new insights on the importance of communications which are founded on mutual trust, shared perceptions between the Senior Management, Safety Officer, and Site Supervisor within the organisations. The safety related representatives from the industry players are validated based on the appropriateness, the ease of use, and the coverage of the framework.

**Keywords:** Framework, safety culture, Malaysian construction companies

### **INTRODUCTION**

The incident rate of fatal accidents in the construction industry is higher than any other industries (Suraji, 2001). The high rates of accidents involved in the construction industry in many parts of the world have given it a poor image. According to Mohamed (1999), a zero-accident culture can only prevail if contractors

are committed to realizing fundamental change in the industry. A prerequisite for such improvement is to treat safety as an important and integral constituent of daily work routine, rather than as an appendage. In Malaysia, about 4% of all industrial accidents are contributed by the construction sector. Annually, an average of eighty workers was killed in the accidents (Chan Onn, 2006).

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The introduction of self-regulation, through the enactment of the Occupational Safety and Health Act (OSHA) in 1994, was to promote safety culture. On the other hand, no measurement has been established to enable the industry players to gauge their current state of safety culture. Thus, this paper presents the development of a framework to promote safety culture within construction companies so as to achieve a good and uniformed understanding of the concept and the current status which is being evaluated.

The following discussion focuses on the methodological development of the framework, the components, and the validation approach that leads its way to the main findings and discussion before drawing conclusions.

#### **A REVIEW ON SAFETY CULTURE FRAMEWORK**

A review on the earlier safety culture models and research sought to describe what an effective safety culture and its characteristics look like rather than explaining on the development of such a culture by an organisation. The review of these models is also a consensus view of the safety culture at the organisational level, either in part or as a whole. IAEA (1991) considered the management system, whereas Grote and Kunzler (2000) concentrated on the organisational and external factors, and AEA Technology (1993-1994), as revealed by HSE (1999), emphasized on organisational variables which influence the work environment and group processes, as well as individual behaviour (Cox *et al.*, 1997). On the other hand, a combination of the three elements, namely subjective psychological factors, observable on-going safety-related behaviours and objective situational features, was established by Cooper (2000). In this context, the characteristics of the factors were used to capture the various terms used in studies on safety culture as indicators, dimensions, features, factors, approaches, and characteristics. Moreover, these will be presented in descriptive form and tabulation (framework) or illustrated as models.

The development of the framework, which was adapted in this study, is the Reciprocal Safety Culture Model by Cooper (2000). This is due to the fact that the characteristics of these factors constitute Psychological, Behavioural, and Situational factors which allow triangulation of the perspectives in the context of safety culture within an organisation. These three elements also mirrored those accidents causation relationship found by a number of researchers (e.g. Heinrich *et al.*, 1980; Weaver, 1971; Suraji, 2001). Furthermore, the model itself promotes self-regulatory processes which are consistent to the definition of safety culture as 'the product of shared values, beliefs, attitudes, and patterns of behaviour, based on a top-down approach practices that are concerned with minimizing the exposure to conditions considered dangerous or injurious to the entire group members on a self-regulatory basis', as established from the literature (Faridah *et al.*, 2004).

The literature review on safety culture shows that there are numerous indicators or practices of good safety culture. However, the specifics that characterize their excellence and the measurement were descriptive and do not show the process on how safety culture can be improved, leading to improved safety behaviour. While safety management system reflects the competency of the organisation to manage safety, safety culture reflects the actual commitment throughout the organisation (Eurocontrol, 2005). Safety culture theory reveals that individuals' behaviour is influenced by the values of their superior (particularly the top management), and peers, and the basic assumption on how safety works in their organisation. Values are those "espoused" by management (the 'talk'), or the actual acts (e.g. praising someone for safety conscious) which can be seen as "symbols" because they are visible (the 'walk'). Thus, the framework also includes the three safety components;

- The psychological factors which are the values and beliefs that underlie their behaviour.

- The behavioural factors which are brought to the surface through the observable practices.
- The situational factors which are portrayed through an internal organisation's environment that reinforced the desired behaviour and the adaptability to the external changes and demands on the safety requirement.

## THE METHODOLOGICAL DEVELOPMENT OF THE FRAMEWORK

### *The Unit of Analysis*

The target respondents involved in this study were grade 7 contractors registered with CIDB (CIDB Directory 2003-2004). The underlying focus for the present research was delimited to an examination of the organisational safety culture from an individual perspective, as proposed by Kristof (1996) and Van Vianen (2000). The approach is consistent with the proposition that the top management is in a position to influence cultural identity, a top-bottom approach as established by IAEA (1991), Cox *et al.* (1997) and Mohamad (2003).

### *The Process*

The literature review indicates that the psychological factors covering the aspects of beliefs since the safety culture is a cognitive factor itself. The behavioural factors comprised of factors identified via the Preliminary Survey, namely leadership, management commitment, organisational commitment, resource allocation, and training. The characteristics of the situational factors consist of both the internal and external factors. The internal factor refers to the safety management system, whereas some of the external factors influencing the organisations are the government policies, enforcement, rules and regulations.

The development of the framework involved the sequencing of the three research methods, namely the Preliminary Survey, the Main Survey and the Semi-structured Interviews. Hence, the

components of the framework focused on the outcome of these research methods.

### *The Characteristics*

The development of the Safety Culture Improvement Matrix which is based on Business Excellence Model (BEM) for used by Nuclear Installation Inspectors, possessed the following criteria in its development (HSE, 1999). Thus, the development of the framework to promote safety culture in the context of the Malaysian construction organisations adapted the needs to fulfil the following characteristics:

- Allow users to recognize what is required to promote or improve safety culture.
- Be applied via self-assessment basis.
- It must be theoretically sound.
- It must be applicable to a range of organisation types.
- Be sufficiently detailed to allow specific areas of improvement to be highlighted.
- The framework must be progressive, directing progressive improvement.

## THE METHODOLOGY

### *The Preliminary Survey*

This forms the first stage of the methodological development of the framework. These involved the identification of the management practices that embed safety culture into the organisational culture. The characteristics of good safety culture practices form the basis for the development of the questionnaire. The 24 organisational and safety implementation statements in the second part of the questionnaire were designed to enable responses to identify and add on to a given list, the management practices that facilitate the embedding of safety culture into the organisational culture. Five factors were identified, and these include Leadership, Organisational Commitment, Management Commitment, Safety Training and Resource Allocation (Faridah *et al.*, 2005). The preliminary

survey was directed to a total population of 866 (overall total population in the Klang Valley is 1,171) construction companies in the Klang Valley that undertake building works.

#### *The Main Survey*

The formulation of the Main Survey formed the second stage of the framework development. Since safety culture is a concept, it needs to be operationalized. Sarantakos (1998) stated that operationalization is an indispensable tool of quantitative measure but its methodological aspect should not be overestimated. The three major elements of operationalization according to Sarantakos (1998) are:

- *Selection of indicators* which reflected the presence or absence of the elements the researcher set out to measure.
- *Quantification of the indicators*, identification of the continuum of values the indicators can assume, and *assignment of scores* that represent the degree of presence.
- *Quantification of variables*, identification of the continuum of values the indicators can assume, and *assignment of scores* that represent the degree of presence.

Generally, a seven-point likert scale with seven items for each was used to measure all the dimensions of these three factors. This led to the development of the Main Survey measuring the psychological, behavioural, and situational factors of the Malaysian construction companies (Faridah *et al.*, 2006).

The questionnaire survey was divided into three main sections. The first section solicits the background of the respondents, while the second focused on the priority given on the characteristics of the three main factors, as well as the psychological, behavioural, and environmental factors. The final section solicits on the safety performance of the companies. The main survey was directed to 117 respondents who had responded to the Preliminary Survey undertaken prior to this survey.

#### *The Semi-structured Interview*

In the third stage, the semi-structured interviews identified and established the importance of communication, mutual trust, and commitment between the senior management, safety officers, and site supervisors within the organizations for practical promotion of safety culture.

Therefore, the safety officer and the site supervisor of the same organizations were interviewed for the following reasons:

- To validate the perception of the Senior Manager about the organizations.
- To compare the perception against the Senior Manager's perceptions.
- To determine and establish how the Senior Manager's communicate based on the mutual trust and commitment into action down the line to the Site Supervisory level.

The 48 organisations formed the sample for the interviews. These 48 respondents, who had responded to the main survey, were further invited to participate in the interview. Out of the 48 organisations, eleven (11) had participated in the semi-structured interview which was represented by the top management, middle management and the first line management. This made up a total of 33 personnel being interviewed.

#### *The Industry Validation*

The developed framework to promote safety culture was face validated by the panels representing the Public Works Department (PWD), Master Builders Association Malaysia (MBAM), KLIA Training and Research Consultant (KLIATR), National Institute of Occupational Safety and Health (NIOSH), Department of Occupational Safety and Health (DOSH), and academicians in a local university.

These panels of the validations were selected based on their proactive involvement and contribution in enhancing safety at the

national level. However, the validation was limited to the aspects of appropriateness, ease of use, as well as coverage in terms of its content, components, elements and items, and soliciting comments for future improvement.

## FINDINGS AND DISCUSSION

This research adapted the useful framework based on the work of Cooper (2000) who distinguished the interrelationship between the characteristics of the psychological, behavioural, and situational factors of safety culture. Cooper used different sets of research methods and dimensions to measure the psychological, behavioural, and the situational factors. However, in the context of this research, a mixed method was employed. Furthermore, the examination of safety culture was done from the individual perspectives of the senior executives to form its data source. The approach is consistent with the definition of safety culture, i.e. 'the product of shared values, beliefs, attitudes, and patterns of behaviour based on a top-down approach practices that are concerned with minimizing the exposure to conditions considered dangerous or injurious to the entire group members on a self-regulatory basis', as established in this context.

Nevertheless, only a few studies have been conducted to discover what managers (especially senior management) really think about health and safety (Gadd *et al.*, 2002). In order to enhance the practicality of the research, the development of the framework involved the sequencing of three research methods covering the preliminary survey, the main survey and the semi-structured interviews which were supported by a comprehensive literature review.

The first stage of the development process involved the identification and establishment of the management practices that embedded safety culture into the organisational culture. This was followed by summarizing a total of five testable factors identified in the Preliminary Survey. These factors are described as follows:

- Leadership
- Organizational Commitment
- Management Commitment

- Safety Training
- Resource Allocation

The second stage was the operationalization of the concept of safety culture. The literature review indicated that the present research should include scales dealing with the characteristics of the aspects of psychological, behavioural, and situational factors against traditional measurements of safety performance, i.e. accident rates and loss time injuries. This is consistent with the finding by Sekaran (2003), who termed operationalization as defining a concept to render it measurable and was done by looking at the behavioural dimensions, facets or properties denoted by the concept. The psychological factors cover the aspects of beliefs since safety culture itself are cognitive factors. The behavioural factors comprised of factors identified via the preliminary survey, namely leadership, management commitment, organizational commitment, resource allocation, and training. The characteristics of the situational factors consist of the internal, i.e. the safety management system of the organization and the external factors influencing the organizations such as the government policies, enforcement, rules and regulations, etc. Generally, a seven-point Likert scale, with seven items each, was used to measure all the dimensions of the three factors. This led to the development of the main survey which was meant to measure the psychological, the behavioural, and the situational factors of the Malaysian construction companies.

In the third stage, the semi-structured interviews identified and established the importance of communication, mutual trust, and commitment between the senior management, safety officers, and site supervisors within the organisations for practical inculcation of safety culture.

The developed framework fulfils the following characteristics;

- It allows users to recognize what is required to develop or improve an organisation's safety culture.

- It provides guidance on those processes and steps required to develop a “good” safety culture.
- It portrays the definition of safety culture in its context.
- The framework is able to be applied on the basis of self-assessment.
- It constitutes the common elements of safety culture found among investigators.

Previous research (Turner, 1989; Hofstede, 1991; Pidgeon, 1991; Ostrom, 1993; Geller, 1994; Guest, 1994; Berends, 1996; IAEA, 1997; Cooper, 1998: 2002; Clarke, 1999; Fleming, 1999; Cox, 2000; Lee, 2000; Wilpert and Naosuke, 2001; Gadd, 2002; Vredenburg, 2002; Weigmann, 2002; Zhang Hui, 2002; Mohamed, 2002; Stewart, 2002; Schein, 2004; Teo, 2005) do not show the process how safety culture can be improved so that an improved safety behaviour can be achieved. Thus, in order to understand the process, the framework to promote safety culture for the Construction Companies is illustrated in *Fig. 1* (Appendix A). The phases involved components, elements, and items which were identified and established through the preliminary survey; the main survey and the semi-structured interview.

## CONCLUSIONS AND RECOMMENDATIONS

The approach in the development of this framework is consistent with the postulation that only the top echelons of leaders are in a position to significantly influence cultural identity and change. The three safety components should run concurrently for successful results. However, to understand and simplify the framework, the activities were divided into three phases.

Phase 1 of the processes requires the senior management to in-built strong safety values and beliefs, followed by transforming these values and beliefs into observable behavioural practices which are demonstrated and characterized by leadership, organisational commitment,

management commitment, safety training, and resource allocation. Furthermore, creating an internal environment that reinforced the desired behaviour, adapting and aligning to the external environmental factors formed Phase 2 of the Framework.

Since the ability to communicate assumptions and values is an important enabler for achieving shared perceptions, the vision which lays out the desired safety culture is then clearly communicated, portrayed through the behavioural actions, implemented via mutual trust and commitment to safety officers and site supervisors. The senior management leads through the visible actions of these personnel to align the attitudes and behaviour of the workforce towards the vision and this formed Phase 3 of the framework.

The validation exercise acknowledged on the appropriateness, the ease of use, and the coverage of the proposed framework. The suggestions for future improvements set out new avenue for future research.

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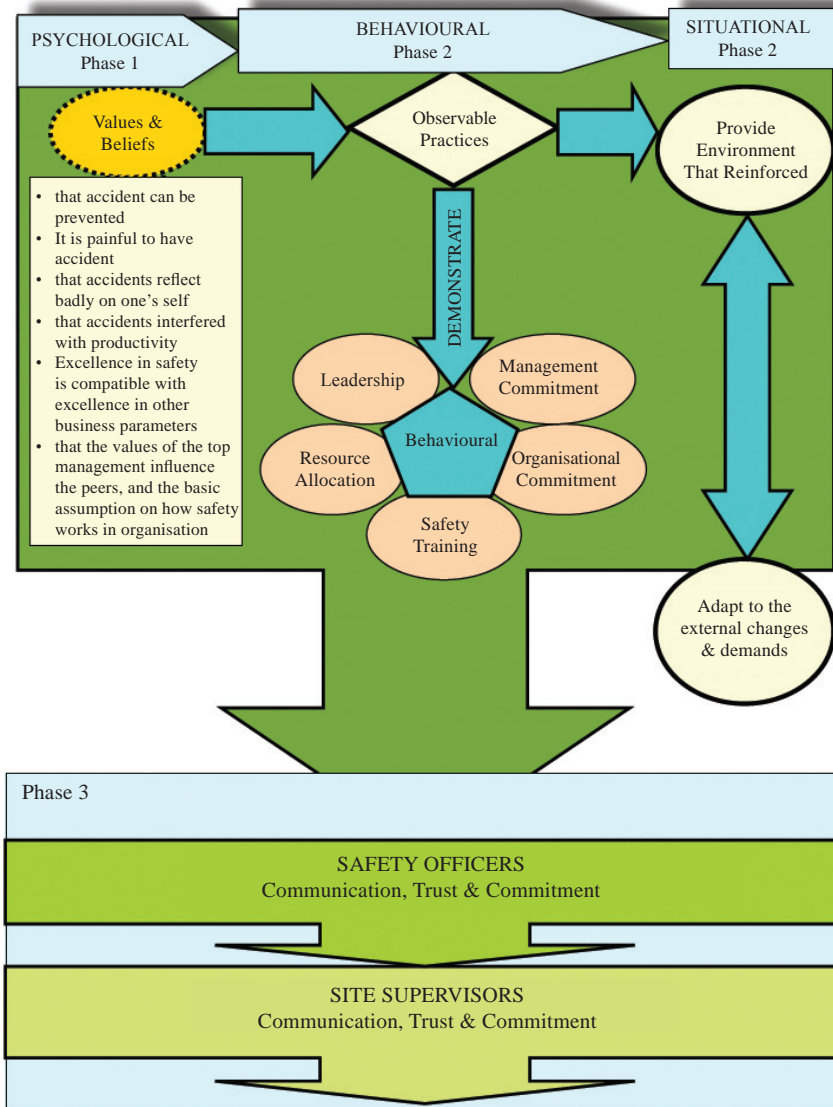
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**APPENDIX A**



*Fig. 1: The framework to promote safety culture*

**PHASE 1**

**Psychological**

The cognitive towards safety is developed by

- Strong beliefs that accident can be prevented
- It is painful to have accident

- A belief that accidents reflect badly on oneself
- A belief that accidents interfere with productivity
- Excellence in safety is compatible with the excellence in other business parameters such as quality, productivity, and profitability; they are mutually supportive
- A belief that the values of the top management influence the peers, and the basic assumption on how safety works in their organisation

## *PHASE 2*

### **Behavioural**

The values and belief is translated into observable behavioural practices which are characterized through the elements of leadership, organisational commitment, management commitment, safety training and resource allocation.

### **Situational**

The situational comprise the internal and the external factors. The characteristics of the situational factors consist of the internal, i.e. the safety management system of the organisation and the external factors influencing the organisations such as the government policies, enforcement, rules and regulations, etc.

## *PHASE 3*

### **Safety Officers' and Site Supervisors' Level**

- Communicate safety concern clearly
- Create mutual trust
- Demand commitment