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The Behavioural Based Safety (BBS) and Culture Change Approach for Managing Workplace Safety

Faridah Ismail[1]*, Norizan Ahmad[1], Ahmad Ezanee Hashim[1] and Razidah Ismail[2]

[1]*Faculty of Architecture, Planning and Surveying, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia*

[2]*Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia*

ABSTRACT

This paper attempts to investigate the current literature on behavioural based and culture change approach on workplace safety. It draws on current publications and the findings of a two recent research study; Safety Culture and Behavioural Based Study Approach. A semi-structured interview and questionnaire survey approach methods was adopted for both studies. The interrelationship, the comparison in terms of concept, characteristics, and application and implementation steps is analysed. The findings revealed that culture formation can be thought of as a series of behaviours and consequences. Behavioural Based approach to safety focuses on workers' behaviour as the cause of most work-related injuries and illness. In contrast, the culture change approaches to safety are "top-down", focus on changing the values and beliefs of the organisation, and involve working with the leadership of the enterprise. Hence, both approaches are complementary and a combination of the two will enhance workplace safety.

Keywords: Framework, safety culture, Malaysian construction companies

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E-mail addresses:
farid346@salam.uitm.edu.my (Faridah Ismail),
norizan712@salam.uitm.edu.my (Norizan Ahmad),
ezanee54@yahoo.com (Ahmad Ezanee Hashim),
razidah@tmsk.uitm.edu.my (Razidah Ismail)
* Corresponding author

INTRODUCTION

The main focus over the past 150 years has been on improving the technical aspect of engineering systems to improve safety, and these efforts have been successful. As the frequency in technological failure in industry has diminished, the role of human behaviour has become more apparent, and safety experts now estimate that 80-90%

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of all industrial accidents are attributed to human factors. According to Fleming and Larder (1999), it is now widely accepted that the most effective way to further reduce accident rates is to address the social and organisational factors that influence the safety performance. Management has come to realize that the general likelihood of an accident occurring in their plant depends not just on the actions of the individual employees but on the safety culture of the organisation (Flemming *et al*., 1999).

The Behavioural Based Safety (BBS) approach and the Safety Culture Change approach has attracted debate and gained attention for managing workplace safety (Dejoy, 2005). A preliminary exploration on the Malaysian Society of Occupational Safety and Health (MSOSH) revealed that, unlike safety culture change approach, BBS is only practiced in the oil and gas industries in Malaysia. Further, training for BBS is offered by a small number of training providers.

The present paper attempts to investigate the current literature on behavioural based and culture change approaches on workplace safety. It draws on the current publications and the findings of two recent research studies; namely, the BBS approach (Faridah *et al*., 2010b) and safety culture (Faridah *et al.,* 2010a).

MANAGING WORKPLACE SAFETY

The organisational benefits of an effective safety programme have been found to increase in profits, improve reputation and image, and reduce insurance premiums. Most importantly, the benefits will decrease accidents at job sites (Koehn *et al.,* 1995). The increase in the awareness of safety among construction companies, according to Wilson *et al*. (2000), is attributed to many factors. The construction industry has come to recognise the relationship between risk management and return on investment (Davis, 1998, as cited in Wilson *et al.*, 2000). The ever increasing cost of medical treatment, convalescent care, and the potential for lawsuits all add-up to higher insurance premiums, which in turn tend to have a negative impact on a company's profit (Heinz *et al*., 1998). In addition, the significant of safety programme is further highlighted when the International Labour Office (ILO) considers safety culture and management system approach to be essential elements for the improvement of performance (Mandorf, 2000).

CULTURE AND BEHAVIOUR RELATIONSHIP

According to Schneider (990), translating culture formation into behavioural terms helps people understand how the process works. People learn more from behaviour than from printed statements and company policies. Behaviour is the function of its consequences and these make behaviours strongly associated with learning (Schneider, 1990). Research from social learning theory noted that individuals in social settings may learn which behaviours and opinions are rewarded and punished by observing others. Hence, there seems to be an acknowledged connection between behaviours and the

development of culture. Since behaviours are a function of their consequences, culture formation can be thought of as a series of behaviours and consequences. The more a management or a work group reinforces a particular behaviour, it is most likely that behaviour will be exhibited in the future. Table 1 shows that culture has many elements, layered along a continuum of subjectivity and accessibility among researchers. The safety culture core layer for Hofstede (1990) is spread over the two layers of Schein (1985, 1992, 2004) and Schneider (1990).

Attitudes and behaviours are closely associated in organisational culture. While organisational culture is a cognitive construct, the behavioural interactions between people make culture manifest. However, culture according to Schneider (1990) can only be changed through changes in behaviours. The attitudes need to be changed and reinforced too since culture is a cognitive construct. An attitude lies between the beliefs and the intended behaviour, as suggested by Lingard (2002) and Stewart (2002, p. 11). However, the basic principle of the behavioural approach acknowledges that change in behaviours will only occur if the new behaviours lead to a higher probability of receiving desired consequences (Schnieder, 1990). The individual then has the choice of accepting, accommodating or rejecting the change. However, the issue is not the choice but whether the individual revises the culture of the organisation with the change.

Many researchers have found a direct organisational culture – performance link. According to Siehl and Martin (1990), a "strong" organisational culture is where espoused values are consistent with behaviour and where employees share the same view of the firm.

According to Ostrom (1993), good safety cultures do have things in common. Good safety cultures have employees with particular patterns of attitude towards safety practices. Employees are alert for unexpected changes and ask for help when they encounter any unfamiliar hazard. Good safety culture organisation rewards individuals who call attention to safety problems and who are innovative in finding ways to locate and assess workplace hazards. All groups in the organisation participate in defining and addressing safety concerns. These will result in a development of

TABLE 1
Levels of Culture

Reference	Core	Layer 2	Layer 3	Layer 4	Layer 5
Schein (1985, 1992, 2004)	Basic Assumption	Values	Artefacts		
Hofstede *et al*. (1986, 1990)	Values	Rituals	Heros	Symbols	
Schneider (2000)	Basic Assumption	Values	Behavioural norms	Patterns of behaviour	Artifacts

positive attitudes towards safety. According to Ostrom (1993), organisations with a good safety culture are also reflective on safety practices. They have mechanisms in place to gather safety related information, measure safety performance, and bring people together to learn how to work more safely. They use the mechanism not only to support solving immediate problems but learn how to better identify and address those problems on a daily basis.

A corporate culture that values safety can be created if they define and practice what has been accepted by a company. Ideally, the employees should know all the risks associated with their jobs, what is required for safety and take responsibility for them. These will develop the norm in which the employees are all aware of all the risks in their workplace and continually be on the lookout for risks. Weigmann (2002) reports suggestions that there are at least five global categories or indicators of safety culture. These include organisational commitment, management involvement, employee empowerment, reward systems and reporting systems.

While several management practices have been cited as important components of safety programmes, none of it shows how much each incrementally contributes to injury reduction. Vredenburgh (2002) has compiled factors found across several reports concerning safety culture based on the works of Cohen and Cleveland (1983); Pidgeon (1991), and Turner (1991). He found that there are six management practices that have been discussed consistently concerning safety culture: (a) rewards, (b) training, (c) hiring, (d) communication/ feedback, (e) participation, and (f) management support. On the other hand, a study conducted among grade G7 contractors' companies in Malaysia on the management practices by Faridah and Torrance (2006) revealed five factors, which include leadership, management commitment, organisational commitment, resource allocation, and training.

This is shown through consistent findings by researchers such as Cooper (1998), Ostrom (1993), Mohamed (2002), Weigmann (2002), Vredenburg (2002), and Schein (2004), as tabulated in Table 2. There seems to be a general agreement that management commitment is the driving force towards the achievement of safety culture. This commitment is then translated into actions and reflected through the behavioural practices that will embed and transmit safety culture into the organisational culture.

THE BEHAVIOURAL BASED VERSUS CULTURE CHANGE APPROACH

One of the strengths which the Total Quality Management (TQM) approach has over a behavioural approach to safety is in the realisation that TQM focuses on "systematic" changes in attitude, which in turn, results in changes in behaviour. The TQM approach to safety offers more long-lasting results as it addresses the core layer of culture; however, the behaviour modification gives quicker impact, especially

TABLE 2
Summary "Good" Safety Culture Features

Characteristics of good safety culture (1960-1980) (Cooper, 1998)	Other essential features (CBI, 1980)	Reflective on safety practices (Ostrom, 1993)	(Mohamed, 2003)	Organisational indicators of safety culture (Weigmann, 2002)	Six Management Practices on Safety Culture (Vredenburgh, 2002)
1. Strong senior management commitment, leadership and involvement in safety 2. Closer contact and better communications between all organizational levels 3. Greater hazard control and better housekeeping 4. A mature, stable workforce 5. Good personnel, selection, job placement and promotion procedures 6. Good induction and follow-up safety training 7. Ongoing safety schemes **reinforcing** the importance of safety, including 'near miss' reporting	1. Accepting that the promotion of a safety culture is a long term strategy which requires sustained effort and interest 2. Adopting a formal health and safety policy, supported by adequate codes of practice and safety standards 3. Stressing that health and safety is equal to other business objectives 4. Thoroughly investigating all accidents and near misses 5. Regularly auditing safety systems to provide information feedback with a view to developing ideas for **continuous improvement**	1. Safety **conscious** among employees 2. **Rewards i**ndividuals who call attention to safety problems and who are innovative in finding ways to locate and assess workplace hazards. 3. Positive **attitude** towards safety at all levels 4. Reflective on safety **practices.** 5. **Mechanisms** in place to gather safety related information, measure safety performance, and bring people together **to learn**	1. management commitment, 2. participation and accountability, 3. procedures and policies, 4. communications, etc	1. Organizational commitment 2. Management involvement 3. Employee empowerment 4. Reward system 5. Reporting systems	1. **Rewards** 2. **Training** 3. **Hiring** 5. C**ommunication** / feedback, 6. **Participation**, and 7. Management **support**

with specific, observable problems (Pardy, 1997). Many safety professionals feel that the key element of a good safety programme is its efforts to modify behaviour and to encourage safe behaviour. Fig.1 illustrates the culture-behavioural hierarchy where the cognitive of the culture elements, through the management system, is brought to surface by the behavioural actions.

Mode of the Approach

In application, Behavioural Based Safety (BBS) is a "bottom-up" approach where the primary attention is directed at specific safety related behaviours that are typically performed by frontline employees (Dejoy, 2005). Changes in the frontline safety behaviours will improve safety performance and be diffused into the organisation to become culture over time. The safety intervention, with the intention of replacing unsafe behavioural practices, significantly improves employee safety performance (Cox *et al.,* 2004; Komaki *et al.,* 1978). The implementation of BBS approach in 1991 in two petroleum refinery companies in United States showed a reduction of injury rate at 54% at the year-end of 1995, indicating the possibility of BBS to be applicable to other sectors (Barton *et al*., 1997). Fig.2 illustrates the mode of culture and behavioural change approaches.

In contrast, the culture change approaches to safety are more "top-down". The focus is often changing the values and beliefs of the organisation, which involve working with the leadership of the enterprise. Identifying the right problems and implementing the right solutions diffused in the form of safety policies, programmes and actions, the entire organisation are being addressed. Faridah *et al*. (2009a) define safety culture as the product of shared values, beliefs, attitudes, and patterns of behaviour based on the top-down approach practices that concern with minimizing the exposure to conditions considered dangerous or injurious to the entire group members on a self-regulatory basis.

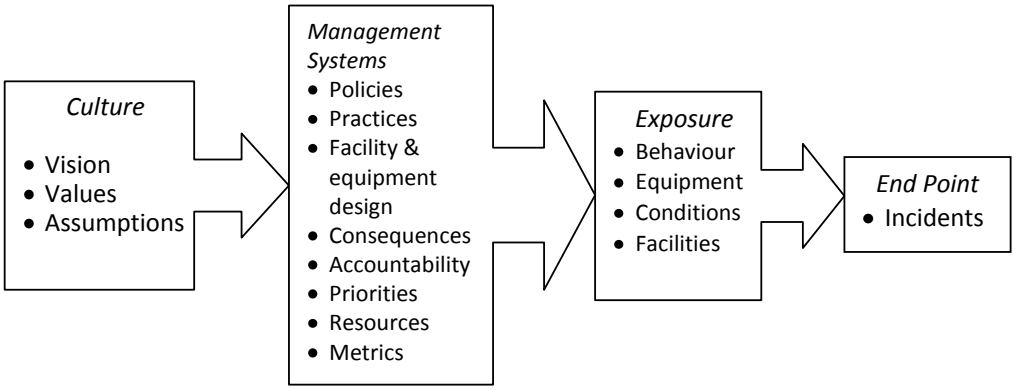

Fig.1: Culture-Behavioural Hierarchy (Source: Krause, as cited in Esposito, 2001)

Point of Intervention

Both behaviour and culture approaches are intervention strategies intended to improve safety performance. Behaviour-based safety targets employees' safety behaviours and thus intervenes at the exposure level, whereas culture change approach intervenes far back in the sequence at the cultural level. Fig.3 illustrates the point of intervention between cultures and behavioural based approaches.

Implementation Steps

The BBS approaches typically involve four well-defined steps (Dejoy, 2005; Krause, 1997); namely, indentifying, observing, intervening, reviewing and monitoring. The identification of specific behaviours in a specific environment is central to this approach. Key or critical behaviours are objectively identified and targeted for change. Meanwhile, performance is observed systematically and tracked over time. Goal-setting is often employed to

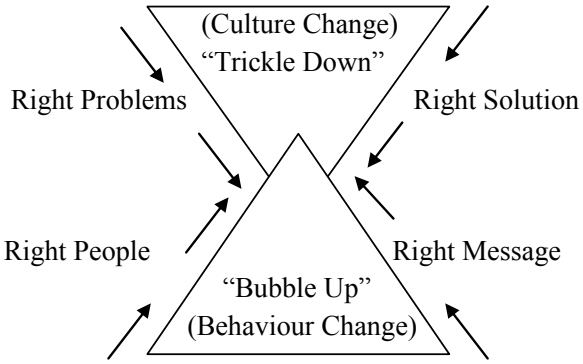

Fig.2: Modes of Culture Change and Behaviour Change Approaches (Source: Dejoy, 2005)

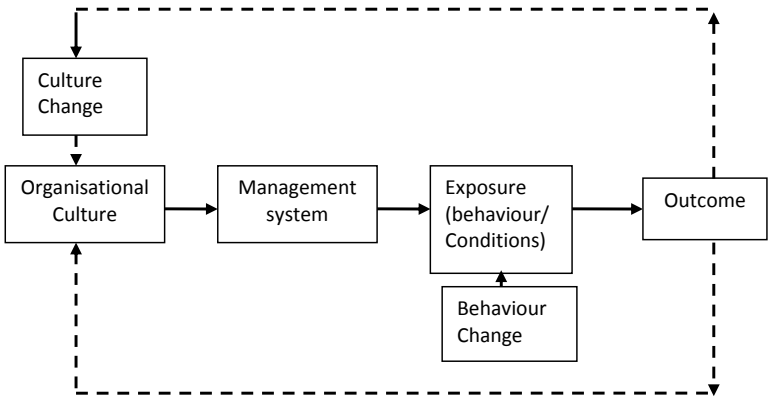

Fig.3: The sequential or stage-based model of safety management (Source: Dejoy, 2005)

focus activity, and feedback on performance is provided to measure progress, provide support, and foster continuous improvement.

The literature review on safety culture shows numerous indicators or practices of good safety culture. However, the characteristics of their excellence and the measurement are descriptive in nature. Further, the process on how safety culture can be improved to result in improving in the safety behaviour is also not shown (Faridah *et al.*, 2009). Alternatively, Faridah revealed what she termed as factors' characteristics for safety culture to address this process, through an extensive literature review on safety culture models; The International Automatic Energy Agency (IAEA, 1991); Cox *et al.,* (1997); AEA Technology, between 1993 and 1994; Grote and Kunzler (2000); Geller (1994); and Cooper (2000). Fig.4 illustrates the factor characteristics of safety culture.

Faridah *et al.* (2009) further developed a framework to promote safety culture which comprises of these three safety components and involves three phases in its processes; namely, the psychological factors which are the values and beliefs underlying their behaviour; the behavioural factor which is brought to the surface through observable practices, and the situational factor which is portrayed through an internal organisation's environment that reinforces the desired behaviour and the adaptability to the external changes and demands on safety requirement.

RESEARCH METHODOLOGY

The current literature on behavioural based and culture change approach on workplace safety forms the platform on the approach of this study. It draws on current publications and findings of a recent research study on BBS Approach (Faridah *et al.,* 2010b) and safety culture (Faridah *et al.*, 2010a).

Three Oil and Gas companies practicing BBS for more than three years in Malaysia were chosen as a case for this study. Semi-structured interview, questionnaires survey, and on-field observation were conducted to retrieve information from all the three cases. The Safety and Health Manager, BBS Facilitator, Safety and Health Officer/ Supervisor, Project Manager and Project Engineer were among the designations of the interviewees selected out of each of the

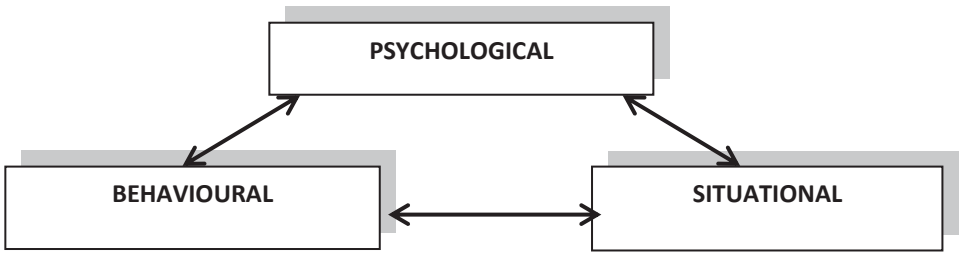

Fig.4: Factors' Characteristics of Safety Culture (Source: Faridah, 2010a)

case studies. The interview solicited the organisations' background, establishment and the implementation steps involved in the BBS practice.

In addition, forty (40) questionnaires were distributed for each case study to seek the current implementation of BBS from the safety officers, safety supervisors, project managers, project engineers, supervisors and other managerial staff and technical staff. The survey questions consist of three parts; Part A solicits data on personal information and organisation's background; Part B focuses on its implementation, and Part C assesses on the management's support towards safety improvement. Management practice towards safety improvement has been divided into two; Safety and Health Policy statements and Behaviour Based Safety (BBS) approach.

The methodological approach to derive the measurement of the concept of safety culture involves the choice of sequencing three research methods. A preliminary survey was carried out to identify the practices that embed safety culture into the organisational culture. The characteristics of good safety culture practices (Faridah, 2004) form the basis for development of the questionnaire. The identified factors, which are behavioural in nature, were expanded further to include the aspects of psychological and situational factors formulated into the Main Survey, which formed the measurement scale for safety culture. The questions were designed to capture these three aspects of safety culture adapted, from Cooper (2000), Stringer (2002), Stewart (2002), and Schein (2004). The methodological development of the framework of the safety culture was earlier discussed in detail by Faridah *et al.* (2010a).

Unlike the BBS approach, the safety culture change approach uses construction organisations as the unit of analysis. The scope of the study was derived from the whole total population of 866 (overall total of 1,171) numbers of a Grade 7 contractors listed under the Construction Industry Development Board (CIDB) Directory who undertakes Building Works within the Klang Valley.

FINDINGS AND DISCUSSION

The behavioural factors are one out of the three components in measuring safety culture. While safety culture is associated with the psychological aspect, behaviours are layers of the culture being manifested. On the other hand, the situational factors reinforce the behaviours and lead to the formation of safety culture. The review of the literature and current findings revealed that both BBS and culture change approach are interrelated and do have things in common in managing workplace safety. Culture formation can be thought of as a series of behaviours and consequences. Both are intervention strategies intended to improve safety performance. Further, the characteristics that each possesses complement one another, as well as provide two modes, intervention point and implementation steps for achieving the common goal of workplace safety. The strength of BBS substitutes the weaknesses of safety change approach vice versa.

BBS focuses on seen unsafe related behaviours and demands immediate corrective action, lesson learnt shared, accepted as norm so as to ensure that no repetition will occur. This complements the culture change approach that addresses the values and beliefs which are cognitive in nature and only seen when they appear in behavioural actions.

Unlike BBS which is limited in its approaches for empirical analysis of critical safety-related behaviours, the culture change working with leadership offers a comprehensive and systematic approach that addresses the entire organisational in managing safety. Hence, BBS offers a short-term approach as compared to the long-term approach of safety culture.

Out of 40 questionnaires distributed, the number of responses received from each of companies A, B, and C, was 22 (55%), 15 (37.5%) and 19 (47.5%), respectively. The findings revealed that the basic implementation steps of BBS approach under the case study comprised of identifying, observing, intervention, feedback, and report. Company B introduced an innovation into the new term as Positive Intervention Walkabout (PIW) in 2007, after first implementing BBS in 2003. PIW is a combination of behaviour based safety and process safety, where they believe that this combination forms a comprehensive approach to improve safety performance. This includes coaching, cross-section visit, intervene and action, cover all area, emphasizing personal and process safety, self follow-up, safety is everybody's responsibilities, web link and appreciating the employees were identified. Further, Company C innovated BBS into the LPO process accommodated within 8 steps, as follows: Identification of target areas, selection of observers and scheduling observations, preparation for observation, conduct observation, feedback discussion session, quality review and approval by Area/ Department/ Operation Manager, communication and implementation of solution and recommendation and verification and validation of solutions.

A separate safety culture study involved a preliminary survey, where the questionnaires were distributed to 866, grade G7 contractors' companies undertaking building works in the Klang Valley. The response rate of the preliminary survey was 16.67%. The *principal components* for the extraction method with *varimax* rotation were used, where six factors were extracted as detailed in Faridah *et al.* (2009). Detail surveys measuring all these six factors were further distributed to the contractors who responded to the preliminary survey. The mean score was used to deduce from the detail survey with a respond rate of 48%. The semi-structured interview conducted among 11 contractors' organisation involving three key controlling safety related personnel each; the Chief Executive Officer/Safety Manager; the Safety Officer and; the Site Supervisor revealed the following results.

The culture approach requires the senior management to built strong safety values and beliefs that are translated into observable behavioural practices, and

characterised by leadership, organisational commitment, management commitment, safety training and resource allocation. Further, an internal environment that reinforces the desired behaviour, adapting and aligning to the external environmental factors makes safety culture enhanced. The desired safety culture is then clearly communicated, portrayed through the behavioural actions, implemented via mutual trust and commitment to the Safety Officers and Site Supervisors.

Though safety culture measures behavioural factors, it is at the leadership level (with the hope) that it will filter down within the organisation. Thus, BBS which focuses on safety-related behaviours does not duplicate in its approach but complement instead. The BBS in the context of safety culture can be considered as the internal environmental factor that reinforces the desired behaviours. This suggests that an integration of both the approaches will provide a holistic platform to enhance workplace safety within organisations.

CONCLUSION

This paper has set out the elements involved in the BBS and safety culture approaches towards workplace safety. Based on the study by Flemming *et al*. (1999), unsafe behaviours both directly and indirectly contribute to 80%-90% of workplace accidents and incidents. Culture formation can be thought of as a series of behaviours and consequences. Behavioural Based approach to safety focuses on workers' behaviour as the cause of most work-related injuries and illness.

This study draws on the current publications and the findings of a recent research study on both safety culture and Behavioural Based Study Approach. A semi-structured interview and the questionnaire survey approach were adopted. The interrelationship, i.e. a comparison in terms of concept, characteristics, and application and implementation steps, was analysed.

In contrast, the culture change approaches to safety are "top-down", focus on changing the values and beliefs of the organisation, and involve working with the leadership of the enterprise.

The review has revealed that both approaches are complementary and the integration of both, regardless of sectors, will provide a holistic platform to enhance workplace safety within organisations.

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