Achieving Zero Accident Vision through Management's Positive Health and Safety Culture

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Abstract
The high rate of accidents in the construction industry has been a concern for ages. The current paper highlights essential factors which can help to assure zero accidents in the construction sector. A review of extant literature from various sources including journal articles, and conference proceedings was conducted from databases including Elsevier, Science Direct, Google, Google Scholar and UJoogle**.** Extant studies, spanning over a 12-year period, were sought based on their possession of the relevant key words. It was found that training and induction by management chiefly influences health and safety (H&S) culture and the subsequent realisation of the zero accident goal/vision. Other management factors include leadership, commitment, involvement and planning/promotion of H&S standards. These factors include leadership, commitment, communication, involvement, promotion of H&S standards and training. This study adds to the body of knowledge on H&S performance and provides evidence for assuring zero accidents on construction sites.
Keywords:
construction industry, health and safety, management, safety culture, zero accident

1. Introduction

The construction industry is both economically and socially important (Yoon et al, 2013). However, despite its usefulness, the industry is riddled with accidents and fatalities to the detriment of organisations, society and any economy. The construction industry accounted for one third of all work fatalities in UK, and construction is Australia's third most dangerous industry (Chan, 2012). Accidents cause construction delays, cost overruns, bad reputation, loss of morale and confidence, penalties such as bans and closures, stakeholder dissatisfaction, and financial losses (Arachchige and Ranasinghe, 2015). One way to reduce the accident rates and consequent impacts is through imbibed organisational safety culture, especially with regard to management (Fu *et al.*, 2009). Although the industry is project-based and the rate of accidents varies from pone project to another, one thing that is common is that organisational culture influences the rate of accidents (H&S performance) (Yoon *et al.*, 2013).

Construction related accidents can be eliminated through culture which drives the implementation and practice of H&S and management (or managers) are at the forefront of H&S implementation (Yoon *et al.*, 2013; Fu *et al.*, 2014). Therefore, it is crucial to continuously research on ways to

improve safety culture in organisations in order to reduce accident rates and gear towards a zero accident goal. The current paper reviews extant literature on H&S culture factors in a bid to highlight their importance in realising zero accidents in the construction industry. However, it focuses on management attributes which are essential in fostering H&S implementation.

Materials consulted for the review spanned over a period of 12 years, from 2006 to 2017. They were sourced from databases including Elsevier, Science Direct, Google, Google Scholar and UJoogle. The materials were included based on their possession of key words relevant to the study, including health, safety, zero accident, culture, construction industry. The findings are presented in the ensuing section.

2. Health and safety culture concept

The concept of culture was first established by Edward Burnt Taylor who defined it as, a complex whole that includes art, law, beliefs, morals, knowledge, any other capabilities and habits obtained by human (Okorie and Smallwood, 2010). The term H&S culture made its first appearance to the nuclear debate by the International Advisory Group of the International Atomic Energy Agency (IAEA) following the investigation of the Chernobyl disaster (Agumba and Haupt, 2009; Abdullah *et al.,* 2008).

It is essential to note that every organisation has some kind of H&S culture. It can either be positive or negative. According to Hughes and Ferrett (2008) the H&S culture of an organisation may be described as the development stage of the organisation in H&S management at a particular time. Abdullah *et al.* (2008); Saidin and Hakim (2007b) indicated that H&S culture can be labelled as a set of beliefs, attitudes, norms, technical and social practise that are alarmed with minimising the contact of individuals within and beyond an organisation to dangerous of injurious conditions. The IAEA (2017) defines safety culture as, 'that assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, safety issues at work receive the attention warranted by their significance'. According to Fernandez-Muniz *et al.* (2007), safety culture can be identified in two ways: As a set of perceptions, values, attitudes and patterns of behaviour with regards to the organisational safety, and a set of policies, procedures and practices relating to the minimisation of workers' contact with risks at all levels within the organisation, reflecting high level commitment to prevent accidents and illness.

Furthermore, H&S culture is said to be a subset of organisational culture that influences the attitude and behaviour of workers in relation to the H&S performance of an organisation (Wamuziri, 2006; Okorie and Smallwood, 2010). The outcome of these attitudes and behaviours should be measured and evaluated as it has been lacking in the construction industry. Through this measurement an indication can be given to whether the organisation owns a good H&S culture (Okorie and Smallwood, 2010).

Ahong *et al.* (2012) proposed that the H&S performance of an organisation is largely all about the vision of their managers and employees, meaning that H&S performance depends on people's ideas, thoughts and their understanding of the main factors influencing H&S performance. Moreover, safety culture connotes shared and learned meanings, experiences and interpretations of work and safety which guide peoples' actions towards risks, accidents and prevention. It includes people, processes and values which are most likely to hold when the safety concept is reinforced through positive means, and not just punitive actions (Chan, 2012).

This suggests that the core ideas of an organisation's H&S culture and management system determine the H&S performance. This can be seen with Heinrich's 1980 theory of accident

causation, as shown in Figure 1. The centre represents the thought of mind, which are the core ideas needed by H&S management. This is where the organisation establishes a H&S management approach, management system and management measures. The safety engineering technology, equipment and facilities are then implemented (Fu *et al.*, 2014). Next to it, is the H&S management method, which aims to improve unsafe conditions of object, unsafe behaviour of people as well as the H&S performance within the organisation.
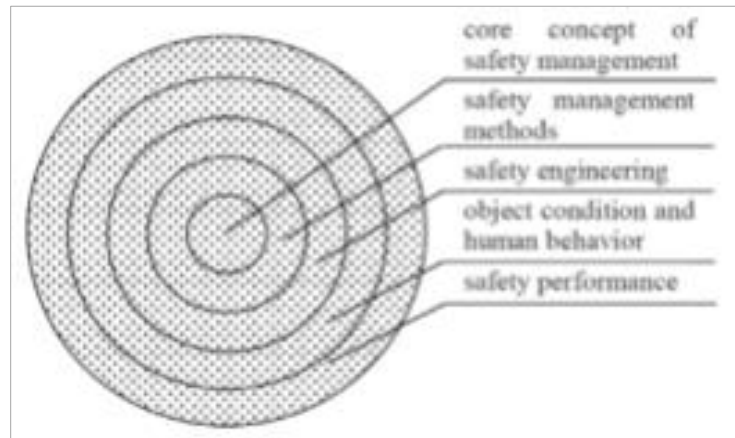

Figure 1: Definition of safety culture (Source: Fu *et al.*, 2014)

Therefore, H&S culture is important due to the fact that it forms the framework within which H&S attitudes develop and H&S behaviour is exhibited in order to gear towards achieving zero accidents.

3. Zero Accident Goal/Vision

The zero goal emerged in the 1990s and was constructed as both a philosophy and a target, the corporate and site voices developing alternative visions of zero in practice (Zwetsloot *et al.*, 2017). However, it has been argued that the concept is not clear since it can either be a "vision" or a "target"; the two are not interpreted the same and this opinion Varies from country to country (Sherratt, 2014).

Zwetsloot *et al.* (2017) opined that the zero accident vision is the ambition that all accidents are preventable or the commitment to create and ensure safe work and prevent all (serious) accidents in order to achieve safety excellence. On the contrary, targets, sometimes very ambiguous, may include reduction of fatalities by say 50% within a 10-year period, as was the case in Sweden (Zwetsloot *et al.*, 2017). However, positioning zero as a numerical target creates a goal to be achieved at a real point in time, which may not be achievable and therefore can be seen as simply reflective of wider industry practice in which people will be safe from harm (Sherratt, 2014; Smallwood and Emuze, 2016). The zero accident goal aspires to a world without severe and fatal accidents, or, in some versions, even without accidents at all, entails an allocation of responsibility, bearing in mind certain principles (Twaalfhoven and Kortleven, ibid.). These principles include that:

- All accidents can be prevented.
- Every accident is unacceptable.
- The management proactively advertises that every accident must be prevented.
- Learning from accidents is considered key to the success of the ZAV

In addition, H&S sees stakeholders and customers placed alongside those at physical risk on sites, all of whom become beneficiaries of a wider zero 'approach' (Sherratt, 2014). Therefore, for the zero accident goal to be achieved, hands-on participation and effort is required from all stakeholders.

However, for H&S culture to be operationalized in order to achieve the zero accident goal or vision, certain factors that form or shape it need to be identified. These are discussed in the next section.

4. H&S culture factors

According to Hughes and Ferrett (2008) all departments of an organisation must commit, before a positive H&S culture can be developed. H&S sees stakeholders and customers placed alongside those at physical risk on sites, all of whom become beneficiaries of a wider zero 'approach' (Sherratt, 2014). Eggort from all stakeholders is necessary in order to achieve the culture needed for the zero accident (transparent) goal (Smallwood and Emuze, 2016). Therefore, for the zero accident goal to be achieved, hands-on participation and effort is required from all stakeholders. Literature identified management-related factors of health and safety culture attributed which are essential if zero accidents are to be assured. These are discussed in more detail hereunder.

4.1 Leadership

Leadership is one of the most influential factors in the development of H&S culture, as it has been recognised by safety experts and construction firms (Abdullah *et al.,* 2008). According to Saidin and Hakim (2007d) and Saidin *et al.* (2008), a positive H&S culture can be accomplished through co-operation between leaders and workers. Mwanaumo (2013) added the need to demonstrate leadership is to motivate and inspire workers to work towards achieving a specific goal, by notifying the workers about the significance of H&S. Leadership, as well as the initial impetus to begin the quest for reduced injuries on site, leadership at all levels set directions such as the ergonomic focus, changes in work organisation, and individual behaviour (Young, 2014). It also has a high level of influence on incident investigation accountability (Kim and Gausdal, 2017). Specific transformational leadership behaviours, such as encouraging workers to work safely and discussing safety openly, maintaining and initiating a safe working environment, listening to safety concerns, and so on are effective in influencing positive attitudes and behaviors towards safety-critical work tasks, as well as safety compliance and participation (Kim and Gausdal, ibid.).

4.2 Effective Communication

Many problems in H&S arise due to poor communication (Hughes and Ferrett, (2008). Communication according to Saidin and Hakim (2007d) and Saidin *et al.* (2008), involves all aspects of work in an organisation and is able to link all entities at every level to H&S aspects. Efficient H&S communication according to Musonda (2012) may entail: feedback and formal reporting systems; H&S briefings; risk control information; clear H&S policy statements and worker involvement in planning and review of H&S. The culture action must communicate company values that are expected and supported by the company (Mwanaumo, 2013:46). Successful communication must ensure 'relevant' information to respective organisational levels (not a one-size fits-all strategy), and allow for 'decentralised' initiatives (Zwetsloot *et al.*, 2017).

4.3 Commitment

According to Hughes and Ferrett (2008:59), commitment must come from top management. They further stated that commitment will result in higher levels of motivation and commitment

throughout the construction organisation. This statement is supported by Saidin and Hakim (2007d); Saidin *et al.* (2008) as they state that leaders, who consider the notion and needs of workers, will be able to increase the work quality and motivation level. Commitment according to Misnan and Mohammed (2007) can be achieved through:

- A Positive attitude towards H&S;
- Promoting H&S in the organisation at all levels;
- Providing financial support, so that H&S can be implemented and;
- Supporting H&S development and implementation.

The effectiveness of H&S committees can also be seen a reflection of management commitment (Musonda, 2012:65). The purpose of H&S committees is to: develop safety values and establish safety as the main goal to be achieved, improve the environment (Saidin and Hakim, 2007d and Saidin *et al.,* 2008).

4.4 Involvement

Involvement of leaders and workers in H&S management is an important indicator when it comes to achieving a positive H&S culture (Saidin and Hakim, 2007d; Saidin *et al.,* 2008 and Teo and Ling, 2006). The involvement, input and participation in H&S management processes leads to empowerment and, in return, helps the organisation's H&S management plan and decisions, to be driven by purpose (Mwanaumo, 2013). To be involved in H&S management according to Musonda (2012) is to be:

- Present in H&S activities, meetings and planning sessions;
- Involved in management contribution towards training;

4.5 Promotion of H&S standards

According to Hughes and Ferrett (2008) every worker within the organisation needs to understand the standards of H&S, expected by the organisation, and the individual role of achieving those standards. It was further indicated that H&S standards cover all aspects of the organisation, such examples are:

- The design and selection of premises, plant and substances;
- Recruitment of contractors and employees;
- Control of work activities including risk assessment;
- Competence, maintenance and supervision and;
- Emergency planning and training.

Long-term safety planning, designing for construction H&S, contractor planning , risk assessment and inspiring innovative approaches will help to ensure that H&S standards are promoted with an aim to achieving zero accidents (Smallwood and Emuze, 2016; Zwetsloot *et al.*, 2017)

4.6 Training

Training according to Saidin and Hakim (2007d); Saidin *et al.* (2008) and Hughes and Ferrett (2008) is a very important part of H&S culture and it is also a legal requirement. The effectiveness of H&S training has been proven to uplift awareness and knowledge of workers on safe working culture. Training is critical when it comes to H&S performance (Fernandez-Muniz *et al.*, 2007). Othman *et al.* (2008) and Hughes and Ferrett (2008) identified different types of training, namely: induction training; job-specific training; supervisory and management training; specialist training. *Induction training* - This type of training is normally provided to new employees, trainees and contractors. Such training will cover items such as quality, conditions, pay and H&S.
Job-specific training - This type of training ensures that all employees perform their jobs in a safe manner. This training is a form of skill training and is best done 'on the job'.

Supervisory and management H&S training - This type of training is similar to that of induction training, but more in depth with detailed treatment of H&S law. This training focus on all level of management as it keeps everybody informed with the legal requirements with regard to H&S, accident prevention techniques and it inspires members of the organisation to monitor H&S standards.

Specialist H&S training - This type of training is required for activities that are not related to a particular construction project, but to an activity. Examples of such training may include: scaffold inspection; first-aid; fire prevention; overhead crane operations *etcetera.*

All these are necessary to gain competence which is vital on the job. Competence is an important factor derived from aspects such as education and training (Fernandez-Muniz *et al.*, 2007). Moreover, training on "zero harm" concept contributes to making an organisation an "accident free" or "zero-harm" enterprise (Chan, 2012).

5. Summary and Concluding Remarks
The construction industry is notorious due to its poor safety record. One of the ways which has been advocated to reduce accidents and fatalities and move towards achieving a zero-accident target is through total safety culture. Safety culture driven by management is even more effectual because they spearhead implementation. The current study therefore sought to identify management factors or attributes which drive safety culture and the vision of zero accidents in the construction industry.

From Table 1, which is a matrix of the reviewed literature and emerging factors, it can be seen that training appeared to be the most important H&S culture factor. This suggests that the construction industry needs to intensify training and awareness about zero accidents. The task of managing and implementing H&S systems and programs cannot also be left up to management alone. The organisation establishes a H&S management approach, management system and management measures but these also rub off on the behaviours and attitude of workers, which may be nonchalant, participatory or proactive. Therefore, workers' participation is crucial if zero accident goal or vision is to be achieved. All construction stakeholders must be involved in identifying ways to intensify training and induction programs in order to educate, not only the workers but all stakeholders on the importance of attaining zero accidents.

Table 1: Factors of health and safety culture

Literature source	Leadership	Effective communication	Commitment	Involvement	Promotion of H&S standards	Training
Teo & Ling (2006)				x		
Fernandez-Muniz *et al.* (2007)						x
Misnan & Mohammed (2007)			x			
Saidin & Hakim (2007d)	x	x	x	x		x
Abdullah *et al.* (2008)	x					
Hughes & Ferrett (2008)		x	x		x	x
Saidin *et al.* (2008)	x	x	x	x		x
Othman *et al.,* 2008)						x
Chan (2012)						x
Musonda (2012)	x	x	x	x		

Haupt *et al.* (2013)						
Mwanaumo (2013)	x	x		x		
Smallwood & Emuze (2016)					x	x
Zwetsloot *et al.* (2017)	x	x		x	x	
Total/frequency	**6**	**6**	**5**	**6**	**6**	**7**

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