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Identifying factors of health and safety (H&S) culture for the construction industry

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ABSTRACT

Purpose:
This paper presents a review of previous studies on the subject of H&S culture and outline key H&S culture factors that are necessary to make the concept useful in the construction industry. A conceptualised model LIP+3C is also presented as the outcome of the review

Design/methodology/approach:
Literature review focused on exploring the conceptual definitions of H&S culture was conducted. A matrix for the identified literature was developed to identify common H&S culture elements.

Findings
It was revealed that there is still confusion and lack of consensus on the concept of H&S culture. However, the H&S culture elements of leadership, involvement, procedures, communication, competence and commitment dominate the literature.

Research limitations/implications:
Literature review was conducted on 15 published peer reviewed journal articles. The validation of the elements found in the study is currently under way although preliminary results confirm the findings.

Practical implications:
H&S culture has been identified as being of great importance to H&S performance improvement. Identifying culture elements that can easily be implemented and understood will contribute to improving the current H&S status.

Originality/value:
Adopting the LIP+3C culture model composed of elements that can easily be implemented and understood will contribute to improving the current H&S status

Keywords: Culture, H&S, LIP+3C, Model

1.   INTRODUCTION

Construction H&S performance improvement has in recent years become a priority and thus has gained industry-wide attention (Cheung et al, 2004 and Hamalainen et al, 2009) because of the economic benefits, the need to improve construction industry image, the need for organisations to be socially responsible and the need for an improved general regard and respect for people working in the construction industry. In addition, the legislative pressure coupled with debate concerning the personal responsibility that senior managers should bear for their organisations on H&S failures (Fitzgerald, 2005) has contributed to most organisations to focus on H&S improvement. However improving H&S performance in the construction industry has also proved to be somewhat challenging partly due to the industry's complex nature. Despite this complexity of the industry, H&S performance improvement remains a crucial issue and its importance or need has been demonstrated in numerous studies (Smallman and John, 2001; Lee et al, 2006; ILO, 2003; and Hoonakker et al, 2005).

The need for H&S performance improvement has been recognised and as a result there are many suggestions and approaches for H&S performance improvement that have been proposed. Amongst these proposals are prevention through design (PtD) (Behm, 2005; Hetherington, 1995; Kinnersley and Roelen, 2007; Weinstein et al, 2005; Gambatese et al, 2005; Hecker et al, 2005), continual improvement of safety management systems (Chua and Goh, 2004), addressing H&S culture (Molenaar et al, 2009; Parker et al, 2006; Molenaar et al, 2002), use of incentives and disincentives (Tang et al, 2008), multi-stakeholder involvement (Lingard et al, 2009; Suraji et al, 2006) and behaviour based H&S (Salem et al, 2007).

However, Culture and particularly the H&S culture of an organisation and by extension, the industry has been identified as being at the core of major accidents and incidents (Oil Spill Commission, 2011; Gadd and Collins, 2002; Wiegmann, 2002). There is also a general agreement on the fact that H&S culture can influence or has an impact on H&S performance (Fernández-Muñiz et al, 2007; Choudhry et al, 2007, and Wamuziri, 2006). Despite the above realisation, there is no consensus on the definition of culture and how culture can be measured in order to be useful for H&S performance improvement. Of the 15 definitions reviewed in this study, 12 of them had definitions that differed from one another (Hudson, 1999; Misnan and Mohammed, 2007; IOSH, 2004; INSAG, 1991; Gadd and Collins, 2002; Fitzgerald, 2005; Fernandez-Muniz et al, 2007; Molenaar et al, 2002; Molenaar, et al, 2009; Wiegmann et al, 2002; HSE, 1993; Dingsdag et al, 2006; and CRC, 2001). As a result it seems as though it is this lack of consensus on these issues that could have caused in part a lack of full utilisation of the concept to improve H&S performance improvement in the construction industry.

In this study, a review of literature has been conducted on the concept of H&S culture in order to harmonise the different views. Based on the literature reviewed, a proposition is made that H&S culture can be

measured and used as a performance indicator. From the synthesised views on the concept, factors of H&S culture have been identified so that H&S culture could be operationalised in a practical and useful way.

2.   WHY CULTURE (H&S)?

Motivations for H&S culture consideration in pursuing H&S performance improvement are many and these are very clear in literature. Specifically, H&S performance has been attributed to an improvement in the H&S culture of organisations in studies such as that of Chinda and Mohammed, (2008); Baram and Schoebel, (2007); Dingsdag et al, (2006); Fernandez-Muniz et al, (2007) and Dingsdag et al, (2006). A better H&S performance has been associated with a positive H&S culture prevailing within an organisation concerned and indeed the industry (Dingsdag et al, 2006; Molenaar et al, 2002; and Chinda and Mohamed, 2008). The prevailing culture is therefore very important in so far as the improvement of construction worker's H&S is concerned. It is because of this observation that Chinda and Mohamed (2008) rightly argue that it seems that attempts to improve the H&S record will not be fully realised until the H&S culture is improved.

It is therefore not surprising that the achievement of an effective H&S culture is recognised to be a vital element of achieving and maintaining satisfactory standards of H&S performance (Entec, 1999). It is also for this reason that IOSH (2004) contends that it is insufficient for example to provide safe equipment, systems and procedures if the culture is not conducive to healthy and safe working. Major disasters in the world attest to the foregoing. For example a "poor safety culture" was identified as a factor contributing to the Chernobyl disaster by the international Atomic Energy Agency (IAEA, 1986) and recently, the safety culture was questioned by the Oil Spill commission .as they argued that the immediate causes of the Macondo well blowout can be traced to a series of identifiable mistakes made by BP, Halliburton and Transocean that reveal such systematic failures in risk management that they place in doubt the safety culture of the entire industry (2011). To illustrate how other industries regard H&S culture, Flin et al, (2000) observed that the so called 'high reliability' industries such as the Air traffic, petro chemical and Nuclear installations, where significant hazards are present, operating organisations and their regulators pay considerable attention to safety assessment. They noted that these assessments are mainly on leading indicators focusing on safety climate which is a measure or determinant of the prevailing culture, because as stated earlier most of these industries have realised the importance of organisational culture Flin et al (2000).

Furthermore, safety culture of the organisation influences the deployment and effectiveness of the safety management resources, policies, practices and procedures Gadd et al, (2002). Traditionally, attempts to improve workplace H&S concentrated on technical issues and individual human failures. However, from investigations that have been conducted in the past, the role of safety culture has been highlighted. For example, Fennell, (1988) on the investigation into the Kings Cross fire, stated that a cultural change in management was required throughout the organisation. In another investigation, Cullen (1990) concluded on the Piper

Alpha Inquiry that it is essential to create an atmosphere or culture in which safety is understood to be and is accepted as the number one priority.

It has become clear that organisations' vulnerability to safety hazards does not originate from just 'human errors', chance, environmental factors or technological failures alone. Rather, it is the ingrained organisational policies and standards which have repeatedly been shown to be at the centre of the catastrophe Gadd et al, (2002). It is the prevailing culture in an organisation and that is the reason why H&S culture has become important.

3.   WHAT IS CULTURE?

Confusion reigns regarding the definition of culture. Culture can be defined as a characteristic set of assumptions, beliefs, values, knowledge, attitudes and symbols shared and held by all members of a group which influences behavioural patterns and perceptions. These can be surfaced through observation and or description of what goes on by those that are part of the organisation (Fernandez-Muniz et al, 2007; Dingsdag, 2006; Australian Government, 2008; Molenaar et al, 2002 and Cooper, 2000). This definition is also summed up by 'the way we do things here' (Cooper, 2000).

It is important to note that there is always some form of culture present in an organisation or industry (Hudson 1999). The only thing is that culture could either be described as positive, negative, a reporting culture, a tolerant culture or any other aspect an organisation so wishes to use to describe the culture. According to Misnan (2007) and Biggs et al (2006), organisational culture exists on a continuum and that organisations can either have a good or poor H&S culture. As H&S culture is a source of influence in determining H&S outcomes, the construct can be a useful tool to manage and further improve H&S outcomes in the construction industry. H&S culture can also be said to be a subset or part of the overall organisational culture (Cooper, 2000; Hudson, 2001; Wiegmann et al, 2002; Wamuziri, 2006). Further, for H&S culture to be operationalised, we have to know what it is made up of or what factors shape or influence it.

4.   WHAT ARE THE FACTORS OF CULTURE (H&S)?

Measuring H&S culture is one area where confusion has reigned partly because of the many terms that have been used to describe what constitutes H&S culture. Some studies have referred to the parts which form, shape or make up H&S culture as characteristics (Fitzgerald, 2005 and Hudson, 1999), Indicators (Fernandez-Muniz et al, 2007, Flin et al, 2000), factors (Misnan et al, 2008), determinants(Chinda et al, 2008), elements (Fernandez-Muniz et al, 2007), enablers (Chinda et al, 2008), and attributes of H&S. It is therefore important to know what these terms mean to partly reduce the confusion. The compact Oxford dictionary (2002) defines the identified terms as follows:

1. Attributes: (v) *or attribute is a characteristic quality. An object traditionally associated with a person or thing. It can also be referred to as characteristic or feature.*
2. Characteristic: (adj) *a typical feature or quality of something or somebody. A distinguishing feature*
3. Determinant: (n) *A factor which determines the nature or outcome of something;*
4. Element/content: (n) *A basic part of something. It can also be referred to as component, constituent;*
5. Enabler: (v) *This is from the word enable which is to provide with the ability or means to do something. To make possible.*
6. Factor: (n) *A circumstance, fact, or influence that contributes to a result;*
7. Indicator: (n) *a thing that indicates a state or level.*

A scrutiny of the above terms reveals that the terms 'attribute' and characteristic refer to the description of quality of something. Therefore, with reference to culture this would refer to the quality or an identifying feature say, a reporting culture.

The term 'determinant' and 'factor' refer to a circumstance or aspect that will contribute to a result. Therefore referring to culture, this term would describe an influence that has a bearing on the quality or type of the culture. In other words, without the factor or determinant it is impossible to have the type or quality of culture being sought.

The term 'enabler' on the other hand is more of a catalyst to achieving a result. A type or quality of the culture does not necessarily depend on the enabler but it would be beneficial if it is present.

An 'indicator' is a thing described as being usually an object like a meter, a clock etc. that indicates the level of a result. Therefore with reference to H&S culture, this could be an instrument or certain exhibits from the culture that could be observed or measured to tell the type or quality of the prevailing culture.

This study set out to establish the components and the factors of H&S culture. Having analysed the terms that have been used before in other studies, and also reference being made to the definition of culture, which is a characteristic set of beliefs and values, assumptions, knowledge and attitudes held and shared by all members of a group, culture can be said to be composed or consisted of beliefs, values, assumptions, knowledge and attitudes (IET, 2009; IOSH, 2004; Molenaar et al 2002; and CRC, 2002). These are the aspects that can be referred to as the elements of culture generally and in particular H&S culture. Hudson (1999) correctly refers to two of these, i.e. belief and values as components of a safety culture. From the definition, an element is a part of something or somebody. These elements in turn influence behaviour in all members of a group including influence or contribution to "the way things are done around here".

As for the terms that would refer to aspects that influence H&S culture, the term 'factor' is more appropriate as it entails an aspect or circumstance that

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contributes to the result. The term 'determinant' could also be used albeit with caution as it suggests more or less the only aspect to influence or determine the outcome.

Many questions surround on how H&S culture could be measured. In other words, to determine what culture is prevalent. In as much as it is desirable to determine or measure the H&S culture, in other words, the beliefs, values, assumptions and attitudes held and shared by a group, undertaking this process to measure culture directly is not easy as it can only be appropriately measured using ethnographic studies (Cooper, 2002). Furthermore, there is still no agreement on the method that can be used to measure culture (Fernandez-Muniz et al, 2007 and Cooper 2002) and continued debate on this is actually not doing well to the concept. It is good to be able to describe and know the prevailing culture in an organisation or industry but it is of no use if this knowledge cannot be translated into actions to improve the status quo.

The argument in this study is that it is much more beneficial, proactive and feasible to operationalise the concept of H&S culture by establishing the factors that contribute or influence H&S culture. Having established these then, efforts can be directed at improving and monitoring these factors. It can be thought of much in the same way as the health of an individual. The health of an individual is dependent on the diet that that individual is following. Following a good healthy diet would result in a better health. In this case, the diet is a contributor or a 'factor' and not the only 'determinant' to the health of that individual just as exercise is also a contributor. Diet in this case is a leading indicator of the individual's health. It is certain that a good diet will result in a good health. A Bad diet may result in bad health immediately or after some years. However for positive results, emphasis should be placed on a good diet. Molenaar et al, (2002) illustrate this point by referring to a cholesterol test. They contend that just as a poor cholesterol test does not absolutely predict a heart attack, a poor safety culture test does not indicate an impending accident. However, both are good indicators that a catastrophe is more likely and that some behaviour should be changed. In this example, diet can be described as a factor because it contributes or influences the health of that individual. The task then is to determine these factors that are key to H&S culture and thus be used as leading indicators of H&S culture.

5.0   ANALYSIS

The rest of this section therefore identifies aspects that have been said to influence H&S culture without regard to the term that it was called but rather focus on its active description. Table 1 also lists the various factors that have been identified in the 15 studies that were reviewed in this study.

According to Chinda et al (2008), the aspect of leadership, Policy and strategy of an organisation, people, partnerships and resources, processes and goals are key contributors to H&S culture. In order to change culture, IOSH (2004) contend that there is need for a commitment to change and there has to be leadership at the highest management level. Although he referred to indicators and global components of H&S culture, Wiegmann et

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al (2002), identified that organisational commitment and involvement, employee empowerment, a reward system and reporting system contribute to the H&S culture. Specific aspects such as education and training have also been identified as vital aspects to obtain an H&S culture (Fitzgerald, 2005; Pellicer and Molenaar, 2007). In a recent study by Choudhry et al, (2009), 11 factors were identified namely commitment and involvement, procedure, psychological feature, economical feature, self-esteem, workers' experience, performance pressure, working environment, job security and education as having an influence on the H&S culture.

Apart from the above, other factors such as communication (Dingsdag et al, 2006 Gadd et al, 2002; Havold, 2007; Mohamed, 2002; IET, 2009 and IOSH, 2004); competence (Gadd et al, 2002; IET, 2009; IOSH, 2004; Mohamed, 2002), and leadership (Dingsdag et al, 2006; Fitzgerald, 2005; IET, 2009) have also been identified as factors contributing to H&S culture. Risk perception of workers (Gadd et al, 2002; Entec 1999; and Flin et al 2000) and more generally policies, procedures and rules (Flin eta al, 2002; Fernandez-Muniz et al 2007 and Mohamed, 2002) have also been identified as factors influencing H&S culture. Perhaps one of the most important factors that has been said to influence culture is the aspect of performance measurement. IOSH (2004), Fitzgerald (2005), Gadd et al (2002), and Pidgeon and O'Leary (2000) all identified this aspect of performance measurement and feedback of results as being one of the influences on H&S culture.

In addition to performance measurement and other factors identified above, the aspect of rewards, incentives and disincentives have also been highlighted as contributing to H&S culture (Wiegmann et al 2002, Molenaar et al, 2009).

The following subcultures have also been identified as components of H&S culture by IOSH (2004):
  1.   An informed culture;
  2.   A reporting culture;
  3.   Fair blame culture where standards are clear as opposed to a no-blame culture which after all is not feasible;
  4.   Clear expectations from all employees about H&S in terms of values, beliefs, attitudes and practice.

However the above subcultures are too abstract and make measurement or determination of these equally difficult as the overall H&S culture.

Table 1: H&S culture factors

Cultural element	Communication	Leadership	Commitment	Involvement	Competence/Training/talks	Procedures/rules/policy/plans
Dingsdag et al(2006)	X	X			X	X
Havold (2007)	X		X		X	x
Molenaar, Park and Washington (2009)			X	X	X	X
IET (2009)	X	X	X	X	X	X
Booth RT(1995)	X	X	X			X
Glendon & McKenna (1995)	X		X			X
Fitzgerald (2005)	X	X	X	X	X	X
Wiegmann et al (2002)	X		X	X	X	X
Pidgeon and O'Leary (2000)			X			X
Gadd and Collins (2002)	x		X	X	x	X
IOSH (2004)	X	X	X	X	X	X
Entec (1999)	X	X	X		X	X
Parker et al (2006)	X		X		X	X
Flin, Mearns, O'Connor. and Bryden (2000)	X		X	X	X	X
Wamuziri (2006)	X		X			

From the above, factors that were common to all studies disregarding what they were referred to were identified and a consolidated list of factors of H&S culture was drawn. It can be said that the key factors which seemed to influence organisational or industry H&S culture included, (1) leadership (2) involvement (3) procedures (4) commitment (5) communication and (6) competence. These were found to be common to all studies and included indicators which when added together described one factor. An example of this is competence. Competence includes training and capacity to manage. All the six identified factors have been referred to as the LIP+3C model of H&S culture. Indicators of each factor of H&S culture were also identified from literature and are presented in table 2.0.

Table 2: Indicators of factors of H&S culture (adapted from Gadd et al 2002)

Factors	Indicators
Leadership	1. Incorporating H&S considerations at every level of decision making; 2. Having a policy on H&S; 3. Active monitoring of H&S programs; 4. Monitor and control all stakeholders; 5. Coordination of all stakeholders involved
Involvement	1. Extent to which stakeholders get personally involved in critical H&S

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	activities;
	2. Presence and contribution to H&S meetings, planning sessions etc.;
	3. Management's contribution to training;
	4. Active management oversight of H&S critical operations;
	5. Ability of management to stay 'in-touch';
	6. Extent to which there is good communication about H&S issues from and between all stakeholders;
Procedures	1. Monitoring and analysis of H&S implementation;
	2. Formal inspections and audits;
	3. H&S planning and defined goals;
	4. Schedule H&S in prequalification and contracts for all parties;
	5. Performance measurement;
	6. Established rules, policies and protocol;
	7. Having a H&S structure;
	8. Hazard identification and risk assessment;
	9. H&S design, plan and specification.
Commitment	1. Demonstrating, a positive attitude toward H&S;
	2. Actively promoting H&S in a consistent manner across all levels
	3. Providing adequate finance and other resources for the implementation of H&S;
	4. Supporting the development and implementation of various H&S activities;
	5. Demonstrating that effort has been put forth to ensure every aspect of operations, and work schedules are routinely evaluated and modified if necessary;
	6. Establishing a reward system for safe behaviour;
	7. Conducting regular H&S tours;
	8. Getting involved in incident, accidents and ill-health investigations;
	9. Deliberately setting H&S as an important agenda item in meetings;
	10. Elevating the status of H&S above production and profits.
Competence	1. An organisation having H&S permanent staff;
	2. H&S training at all levels;
	3. Having H&S knowledge and skills;
	4. Conducting induction programs and refresher courses
	5. H&S formal qualifications for H&S staff
Communication	1. Formal reporting systems;
	2. Formal structured feedback system;
	3. Worker involvement in planning and review of H&S;
	4. All parties comfortably use the reporting system;
	5. Timely and valuable feedback to all parties;
	6. Risk findings being disseminated to all concerned;
	7. Clear H&S policy statements made by management;
	8. Clear statements on expected performance standards regarding H&S;
	9. Risk control information being made available to all available;
	10. H&S briefings, and or bulletins.

Using a perception or climatic survey of the above indicators at all levels of the organisation or industry, an H&S culture can be characterised. The perception or climate survey can expose the "way things are done" or that "degree of effort" concerning the identified factors (Cooper, 2000 and IOSH, 2004). By looking at the factors that have been identified above, it is possible to build a picture of an organisation and also understand where opportunities for improvement lie. In addition to these climate surveys, some researchers advocate for studies such as focus groups and interviews to supplement the climate surveys in order to understand the behaviour (IOSH, 2004 and Wiegmann et al, 2002).

Improvement of culture can therefore typically follow the plan, do, and check cycle. IOSH (2004) proposes that a maturity model and principles of total quality management combined can be used to build an H&S culture by:

1. Assessing the current level;
2. Developing a plan to move to the next level;
3. Implement the plan;
4. Monitor the implementation of the plan;
5. Re-assess the level for further actions (IOSH, 2004).

It is easier and practical to view the identified factors of leadership, involvement, procedures, commitment, communication and competence as action items that can be used to improve the H&S culture and thus H&S performance. The process of improvement can therefore follow the following stages:

1. Assess LIP +3C;
2. Develop strategies to enhance LIP + 3C;
3. Implement strategies;
4. Assess LIP +3C;
5. Compare with baseline levels to indicate movement;
6. Consult and disseminate information ;
7. Develop strategies to enhance LIP+3C;
8. Repeat process 3-8.

Implementing the LIP+3C has to take cognisance of the external environment factors that can equally have an influence on the H&S culture. According to Cooper (2000), H&S culture does not operate in a vacuum; rather it affects and is affected by the external environment.

6.   CONCLUSION

The reason why H&S culture should be considered in the construction industry has been presented. It has been observed that H&S performance improvement is unlikely without the improvement or change in the H&S culture. Only a safe culture can provide any degree of lasting protection (Reason, 2000).

The factors of H&S culture have been identified. It has been noted that the reason, H&S culture has not been utilised to the full has been probably due to the numerous terms that have been used to characterise culture and thus the resultant confusion. In this study, it has been shown that it is beneficial to consider those factors that influence culture and thereafter measure the factors' indicators. This has been described to be more proactive and practical.

The key H&S factors that were found to be common or describe many factors in the studies that were reviewed included leadership, involvement, procedures, commitment, competence and communication which have collectively been referred to as the LIP+3C model of H&S culture.

It has also been shown that the LIP+3C model can be used to both plan for and measure H&S performance. This study has therefore contributed to efforts aimed at improving H&S performance in the construction industry by showing how culture can be operationalised practically.

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