

BEHAVIOUR-BASED SAFETY (BBS): A CONSTRUCTION INDUSTRY'S PERSPECTIVE

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The behaviour related approach to dealing with occupational safety and health (OSH) has been shown to be valuable and as a result many construction organisations employ this method to achieve robust safety management systems. Behaviour-based safety (BBS) has various elements and comes in different forms and designs; and different organisations pay more attention to different elements. As a result, organisations typically give their behaviour-based safety programmes (BBSP) different names and pride themselves for achieving high safety standards because of the aspects of behavioural safety that they focus on. However, it is unclear as to which specific aspects of such programmes are the keys to success and which are of secondary importance to improving OSH. This paper presents the findings of a desk study of the top 100 UK and USA construction organisations (contractors and consultants) ranked by turnover; this involved a comparative analysis of BBSPs that led to the development of seven major themes. This study reveals the need to encourage smaller companies to undertake BBS as well as understand employees' ideals so that they can be effectively and efficiently supported. This study is part of a three-year doctoral research programme that investigates the human aspect of OSH.

Keywords: behaviour-based health and safety, construction, safety behaviour, safety performance.

INTRODUCTION

The behaviour-based approach to dealing with occupational safety and health (OSH) issues, which is recognised as behaviour-based safety (BBS), is known to be effective in reducing accidents that cause harm, and incidents which do not cause harm but have the potential to (Krause et al. 1999). Figure 1 shows Pybus' (1996) evolution of safety culture model, which helps to contextualise the importance of the relationship between behaviour and safety performance.

Pybus' model postulates that safety culture starts from the 'traditional' phase where rules, enforcement and individuality dominate. This helps to reduce accidents but is limited in its effectiveness; hence the rate of reduction of accidents/incidents plateaus. The 'transitional' phase then places an emphasis on the importance of engineering controls and safety management systems; helping to reduce accidents further until another plateau is reached. Finally the innovative phase, where trust in people and being proactive are seen to be essential in order to further reduce accidents, is generated. In this phase, people are key elements and their behaviours become crucial in enhancing safety performance.

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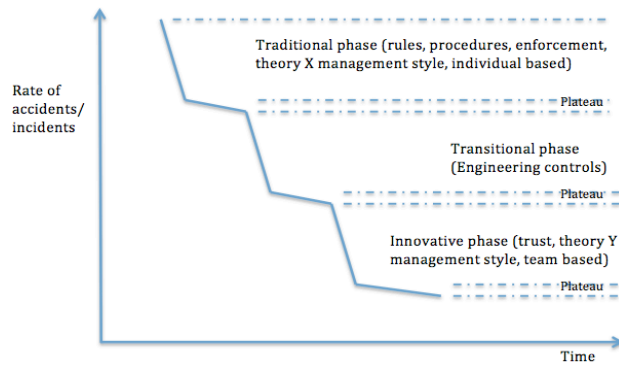


Figure 1: Evolution of safety, adapted from Pybus (1996)

It is important to note that the features of the earlier phases must continue to be applied along with the emphases of the newer phase. Other similar but slightly different models exist (Hudson 2007). However, they all seem to converge on the position that a more humanistic approach to safety is the way to further enhance safety performance.

Various organisations have implemented BBSPs and different studies have shown its effectiveness, for example Sulzer-Azaroff and Austin (2000). However, BBSPs exist in various designs and forms and there is a gap in knowledge regarding the elements of BBSPs that organisations currently rely on to improve safety performance. This paper therefore explores construction organisations' BBSPs as presented on their company websites. The study explored BBSPs to discover emerging themes, differences and similarities between such safety programmes. More emphasis is placed on the safety aspect of OSH as it costs the UK economy more (Health and Safety Executive (HSE) 2014).

SAFETY BEHAVIOUR: FIRST OR LAST LINE OF DEFENCE?

Reason (2009) argues that human acts are a primary cause of accidents; these acts are sometimes intentional and other times, unintentional. Garlapati et al. (2013) buttress this and argue that unsafe behaviours cause most of the accidents in the oil and gas sectors. It therefore follows that, if wrong acts can be reduced, accidents will be reduced as well. HSE (2009) claims that, on one hand, people make calamitous choices despite their awareness of the risks and on the other hand, their interpretations of risks may be flawed. They warn against focussing solely on human behaviour arguing that this is only one factor that affects safety amongst a raft of other factors. Therefore, it should not be treated as the only solution but rather as a part of an effective OSH management system.

Anderson (2005) approaches this matter from a slightly different angle arguing that there are two causes of accidents. One is the direct cause and the other is an underlying or fundamental cause that is further away but has an impact on the accident. Reason (2009) is of the same opinion that many accidents are caused as a result of organisational factors, which can influence unsafe acts. He argues that unsafe acts can essentially be viewed as a consequence of poor organisational factors and maintains that human conditions cannot be changed but the circumstances in which they work can be. Figure 2 explains Reason's (2009) model.

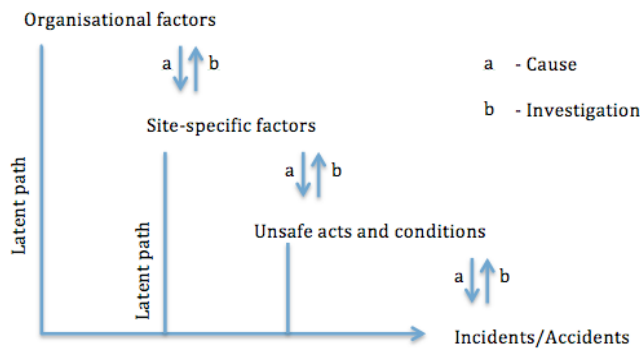


Figure 2: Accident causation prototype, adapted from Reason (2009)

Reason (2009) asserts, like Hopkins (2006b), that there are latent condition pathways that can result in an accident without any direct acts as shown in Figure 2. He further explained that causes of accidents ('a' in Figure 2) should be considered starting from the organisational factors through the site-specific factors ("local conditions"), which Gibb et al. (2006) term "shaping factors" in their ConCA accident causality model, and finally the unsafe acts; whilst the direction of the investigation of accidents ('b' in Figure 2) should be the reverse starting from the unsafe acts.

HSE (2009) agrees with Reason and Hopkins adding that active failures have instant repercussions while latent failures may not be instantly obvious. Active failures are caused by frontline staff like ground workers, labourers and painters whilst latent failures are usually caused by management staff such as managers, directors and designers. Some examples of active failure include disobeying traffic rules on site, not using personal protective equipment (PPE) when required and reversing without a vehicle banksman. Some examples of latent failures include inadequate training, poor communication, inadequate supervision and poor safety procedures. BBS tries to resolve both types of failures though HSE (2009) claims that latent failures are regularly concealed and are potentially worse than active failures.

Figure 3 shows Heinrich's (1931) somewhat simplistic view of the relationship between fatalities and unsafe acts and conditions. The model focuses on the active failures and suggests that fatalities can be reduced and perhaps eliminated if unsafe acts and conditions are eliminated.

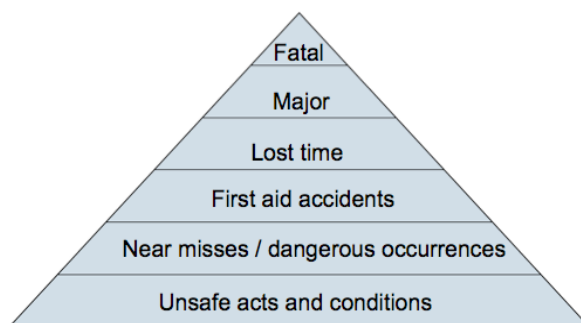


Figure 3: Relationship between safety behaviour and fatalities, adapted from Heinrich (1931)

HSE (2009) explains that unsafe acts can be either "errors" or "violations". They define human error as "an action or decision which was not intended, which involved a deviation from an accepted standard, and which led to an undesirable outcome", while a violation is defined as "a deliberate deviation from a rule or procedure". As safety behaviour can ultimately make or break OSH systems (Reason 2009), it consequently becomes important to understand the motivating factors that drive the

‘right’ behaviours whilst reducing errors and violations. There seems to be advantages in combining Pybus’ (1996) model in Figure 1 and Reason’s (2009) model in Figure 2 (following the approach of Gibb et al. 2006). Reason’s (2009) Swiss cheese model has been adapted in Figure 4 to show how this combination will work.

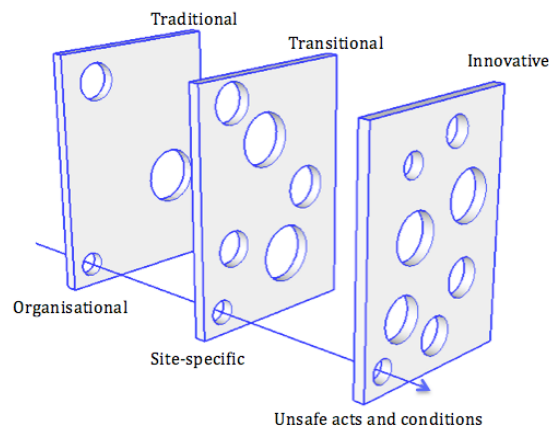


Figure 4: Combination of Pybus’ and Reason’s models

Figure 4 shows the positional relationship of the traditional, transitional and innovative phases of the Pybus model; parallels can be drawn with the Reason model. The traditional phase parallels organisational factors, the transitional phase parallels site-specific factors and the innovative phase parallels unsafe acts and conditions.

Figure 4 also shows that there can be multiple causes of an accident and the latent and active pathways to failure postulated by Reason (2009) somewhat explains this. It must be acknowledged that accident causality is a complex matter and it is difficult to envisage a simplistic solution for it (Haslam et al. 2003). The arrow that runs through each of the plates illustrates an accident path and an accident occurs when all the holes in all the plates line up. If the organisational and site-specific conditions improve, the amount of accidents that materialise are likely to reduce as more holes in the first two plates will be blocked, inevitably cutting off some accident paths. Whether to tackle the traditional (organisational) or the innovative (unsafe acts and conditions) phase first is arguable, however literature suggests that tackling safety behaviours tends to be a last line of defence in practice.

METHODOLOGY

This exploratory study sought to uncover current practice in the construction industry regarding BBS. The websites of 400 organisations were reviewed to extract their safety content, which gives an indication of their safety practices. It is appreciated that organisations are able to place whatever they deem fit on their web pages therefore they may boast of success that they do not have. Also, they may claim to have good BBSPs even if they have none whatsoever; winning more work, being current and remaining competitive are some reasons why a company may do so. In any case, falsely boasting of BBS gives it more credit, as organisations do not normally associate themselves with anything that will bring their reputation down.

The top 100 companies in 2014, ranked by turnover, as listed by Building.co.uk and ENR.construction.com in the UK and USA respectively were considered, as shown in Table 1. The top companies tend to be the leaders of the industry that the smaller companies follow. These companies subcontract work to smaller companies, who often have to meet the requirements already set (by the top companies).

Table 1: Breakdown of the sample size of 400 construction companies

Region	Contractors	Consultants	Total
UK-based companies (Building.co.uk)	100	100	200
US-based companies (ENR.construction.com)	100	100	200
Both UK and US-based companies	200	200	400

Gathering and analysing the data

Companies' names were searched using Google and their websites were accessed. Their health and safety (H&S) sections were scanned thoroughly to comprehend their contents; any points found on behaviour-based safety/behavioural safety were noted. It was found that most of the UK organisations called this kind of safety programme 'behavioural safety' whilst most of the USA organisations called it 'behaviour-based safety'. Many organisations positioned their safety content under the 'Corporate Social Responsibility' (CSR) or 'Sustainability' sections and many others had theirs under the 'Who we are' or 'Our core values' sections. This suggests that whilst some organisations treat safety as a responsibility that is externally bestowed on them or one that they bestow on themselves, others believe that safety is a value of their organisation; not an extra responsibility but simply the way they work.

After all the readily accessible safety information was gathered, the companies' own search engines were used to check for more safety information to identify any additional relevant safety information. For companies that did not have H&S sections and or where nothing was found on H&S, their search engines were used to explore further. Searches on 'safety', 'health and safety', 'safety behaviour', 'behaviour and safety', 'behavioural safety' and finally 'behaviour-based safety' were conducted. The same was done for the USA companies with the adaptation of the spelling of the word 'behaviour' to 'behavior'. To ensure equity across the sample, only the first pages of each of the results were given attention.

The websites of group companies were reviewed as well as that of their individual subsidiaries and it was found that, for some, different subsidiaries had different names associated with their BBSPs. After reviewing the results and going through the relevant content from the links generated by the search, the companies' names were typed in the Google search engine again but this time succeeded by the words 'behavioural safety' and 'behavioral safety' for UK and USA respectively; the same was done with 'behaviour-based safety' and 'behavior-based safety'. As with the website search, only the first pages of each of the results were considered. This secondary search conducted with Google was undertaken because it was found that some organisations had poorly built internal web search engines that did not produce relevant results to searches made. From the searches made, organisations' BBSPs were identified and noted along with text pertaining to safety and behaviour.

A mind map was used initially to synthesize the text and subsequently, a computer aided qualitative data analysis software – NVivo (version 10.2.0) was used to code the text, and emerging themes were identified. Pairing and elimination of themes subsequently helped to narrow the data down, and finally the themes were placed under higher order themes. Braun and Clarke (2006), Bryman (2012) and Saunders et al. (2012) best describe this form of analysis as a thematic one.

FINDINGS

Prevalence of BBSPs

Table 2 shows the number of construction organisations whose websites indicate that they have BBSPs in comparison to those that do not.

Table 2: Number of companies with and without BBSPs (sample size=400)

	UK Contractors	UK Consultants	USA Contractors	USA Consultants	Total
BBSP	22	8	22	18	70
No BBSP	77	92	76	82	327
No website/website issues	1	0	2	0	3
Total	100	100	100	100	400

It is evident that most organisations do not have BBSPs, which is surprising given the emphasis in the literature and the media over recent years. This may suggest that many of the organisations in the sample do not know about the behavioural approach to dealing with safety. It is also possible that some organisations have such programmes but do not want to reveal the contents of their programme, perhaps to hide their flaws or for competitive reasons. Further, companies may be of the opinion that the return on investment of such programmes is low, although Cooper (2010) claims that the opposite is the case.

Figure 5 shows that BBS engagement increases with an increase in turnover.

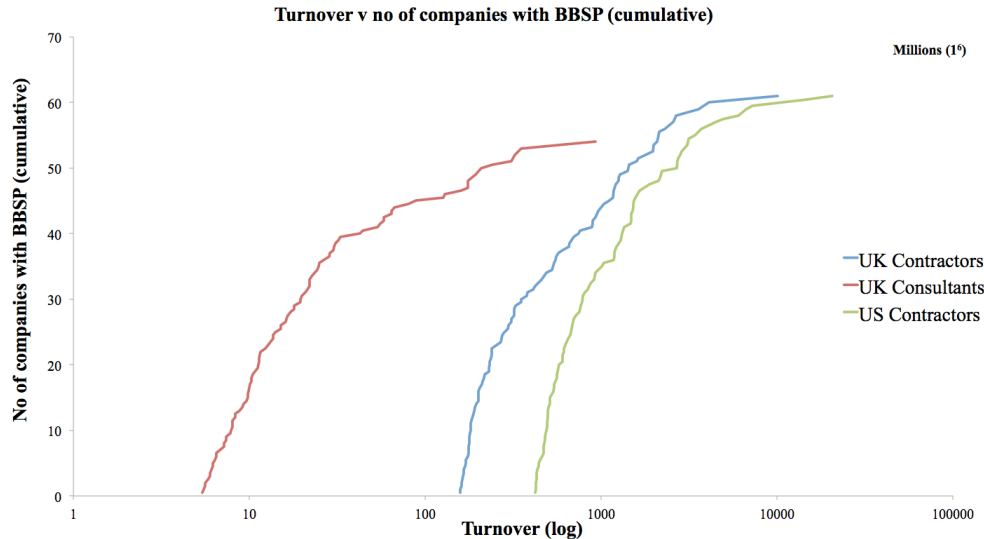


Figure 5: Relationship between contractors/consultants' turnover and BBS engagement

The relationship between turnover and BBS engagement is directly proportional for construction organisations in both the UK and USA; further investigation into these organisations will help clarify why this is the case. Figure 5 suggests that most people in the UK's construction industry do not avail of BBS since small-medium organisations (SMEs) hold the majority of its industrial sector (based on employment) (DBIS 2014). The USA consultants' graph was not plotted, as the individual revenues for these companies were not available, though the trend remains the same. The graph shows that contractors in both countries engage with BBS more than consultants; one

possible reason for this is the notion that clients expect contractors to be more safety aware as they are at the ‘sharp’ end of accident causation. Further, contractors themselves may deem it necessary to improve their OSH management systems substantially, perhaps to win more work or because they genuinely care for employees to be safe.

Key themes emerging from current BBSPs

A word frequency query was performed on the entire data set using NVivo. The first (bbbsp), second (behaviours) and third (safety) words generated were expected as these are generic terms.

‘Zero’ was the fourth on the list. Many organisations have ‘zero’ in the title of their BBSPs, for example ‘beyond zero’, ‘zero harm’, ‘zero incidents’ and ‘target zero’. According to Wilkins (2011), zero accident cultures have become increasingly popular in the construction industry. Sherratt (2014) argues that zero target programmes may encourage people’s commitment to safety, however they may also have a counterproductive effect if people believe that it is an impossible target.

‘Culture’, ranked fifth, appears to be a significant tool that companies rely on to ameliorate OSH. The term “safety culture” can be used to describe the behavioural elements (what people do) and the situational elements (what the organisation has) of an organisation (Human Engineering 2005). Cooper (2002) argues that good safety culture can help to reduce accidents and injuries, ensure that enough attention and regard is given to safety, ensure members of a company understand and share beliefs about risks, accidents and safety and increase people’s commitment to safety. Hudson (2007) argues that safety culture metamorphoses through 5 stages from ‘pathological’, through ‘reactive’, ‘calculative’, ‘proactive’ and finally the ‘generative’ stage.

The culture within an organisation can be different and fragmented (Richter and Koch 2004). Martin (2002) concurs with this view arguing that the superiors within an organisation ought to aim to align these fragments such that they are in agreement with the corporate culture of the organisation. On the other hand, Weick and Sutcliffe (2007) argue that integrated cultures do not deal with uncertainty as well as fragmented cultures, which are more flexibility. They report that High Reliability Organisations are more resilient because many of them have flexible cultures.

Hopkins (2006a) suggests that culture and climate are occasionally used interchangeably. The authors’ previous work suggests that safety culture is different from safety climate (Talabi et al. 2015). They argue that culture is a deep-rooted quality, which is usually influenced by senior management while various organisational actors (internal and external) influence climate. It therefore follows that whilst many organisations refer to culture, they may indeed be referring to climate. Garlapati et al. (2013) argue that climate is equally important, as it is a medium through which greater performance can be achieved.

‘Compliance’ also emerged many times which implies that many organisations are still focused on complying with legislation and indeed, many focus on the requirements of British Standard (BS) OHSAS 18001 (Occupational Health and Safety Assessment Series), which is a framework used to assess and audit OSH management systems. Previous work undertaken by the authors suggests that whilst legislation has undoubtedly reduced accidents, the problem with mere compliance is that the amount of accidents that occur in the construction industry is still unacceptable and safety performance seems to be plateauing (Talabi et al. 2015).

Some other words emerging with high frequency counts include leadership, communication, commitment, engagement, attitude, and awareness, which have all been discussed in past studies (Fernández-Muñiz et al. 2012 and Flin et al. 2008).

Figure 6 highlights seven higher order themes, which all have broader elements that organisations associate with BBS.

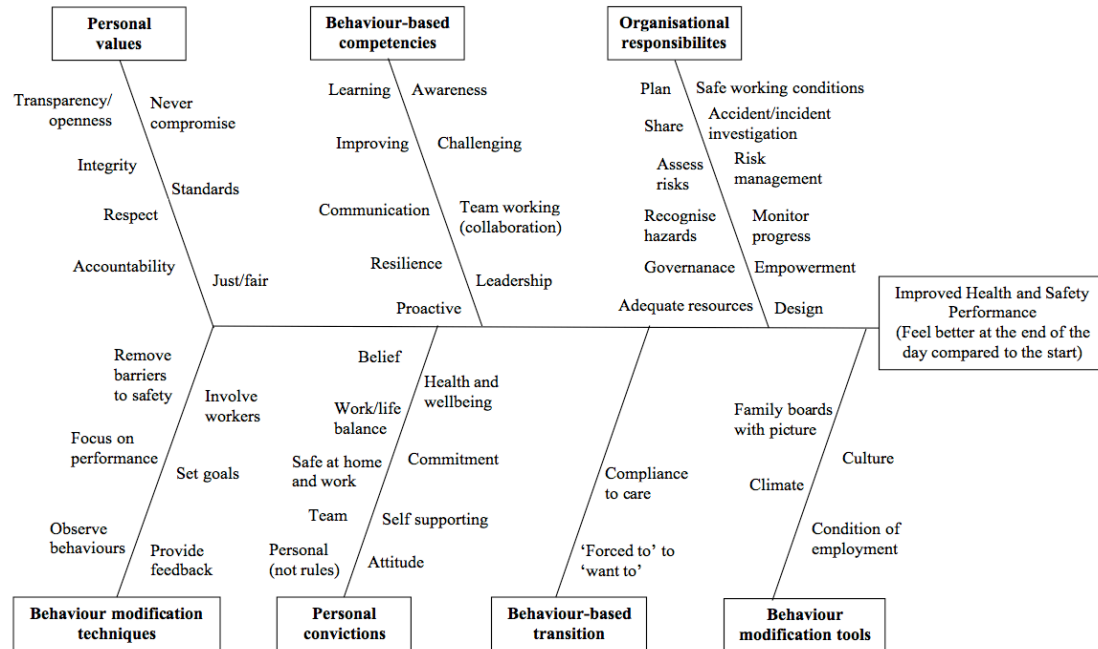


Figure 6: Factors currently used by construction companies to improve OSH

These themes were methodologically organised and categorised based on their definition and significance; after several iterations, the figure evolved. 'Personal values' relate to attributes that make people trustworthy and reliable, 'behaviour-based competencies' relates to people's competence, 'organisational responsibilities' are the fundamental duties of a company, 'behaviour modification techniques' suggest methods by which behaviours can be altered, 'personal convictions' are drivers that nudge people to choose to behave safely, 'behaviour-based transition' is the direction in which organisations that currently utilise BBS are moving and 'behaviour modification tools' are practical ways by which behaviours can be changed.

Most of these higher order themes are behaviour oriented however one of them – 'organisational responsibilities' is more structural. This finding is in line with research that suggests that BBS should not be used as a 'one fits all' solution but rather as part of a comprehensive OSH management system (HSE 2009; Reason 2009; Hopkins 2006b; Anderson 2005; DeJoy 2005). The broader elements of this higher order theme appear to be largely covered by UK legislation whereas the broader elements of the others are not covered in the same way.

Interestingly, out of the entire sample of 400 companies, only one company (in the USA) specified that it wanted its employees to return home better than the way they came to work. Many of the others specified that they wanted their employees to leave the same way they came and this is admirable in itself, however it is recommended that more companies should aspire to ensure that their employees leave work safer and healthier than when they arrived. It appears that more needs to be done to show genuine care and concern for employees in the construction industry. People's safety

and health ought to be valued more and employers should strive to ensure that their employees return home from work physically, mentally and emotionally better than when they arrived. Straker and Mathiassen (2010) argue that organisations are more competitive when work is designed to achieve this.

CONCLUSIONS

The findings of this study have been classified into seven groups, which companies that currently practice BBS pay attention to: personal values, behaviour-based competencies, organisational responsibilities, behaviour modification techniques, personal convictions, behaviour-based transition and behaviour modification tools. Two important classifications emerge from this study: individual values and organisational values. This implies that organisations should critically assess employees' ideals and nurture an environment that allows individuals to align their values with its own. However, they must be aware that this is a development and not the end. This study also suggests that organisations that currently endeavour to do this are in the minority; therefore more companies are urged to adopt BBS. Further, this study suggests that contractors appear to utilise BBS more than consultants. Further research into other industries to investigate whether there is agreement or disagreement with the construction industry is encouraged; lessons can be learnt and transferred among various industries. The next phase of this study will explain why the construction industry focuses on these aspects of BBS.

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