

CONSISTENCY IN ITS INCONSISTENCY: SAFETY CULTURE IN THE US CONSTRUCTION INDUSTRY

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Safety culture remains the subject of much discussion and debate across both academia and industry, remaining a stubbornly abstract and nebulous concept. However, whilst industry is seeking practical guidance and tools for measurement, academia often addresses more theoretical and philosophical aspects of safety culture alongside considerations of its effectiveness and evaluation. However, this body of work arguably lacks insights as to the nature of this academia-industry relationship. Improved understandings of how industry conceptualises and utilises safety culture in practice can inform and enhance the applicability and relevance of academic research in this messy space. To begin to better understand this situation for the US construction industry, semi-structured interviews with 27 safety professionals were conducted. Findings revealed that what is most consistent about safety culture is its inconsistency - on personal, organisational, and industry levels. There is little coherence in its management and curation, and in fact industry currently utilises very few of the concepts highlighted in academic research, suggesting that both might benefit from moving away from the concept of safety culture altogether to avoid distraction in the critical management of occupational safety on construction jobsites.

Keywords: safety climate; safety culture; safety professional; US construction

INTRODUCTION

There has always been something of a disconnect between academics and industry practitioners in the field of construction safety. Whilst academia strives to undertake research able to bring real change and find utility in practice, translation to the jobsite can be challenging. An example of this can be seen in the academic development of increasingly complex tools to support incident investigation that aligns to non-linear theories of incidents (Hovden *et al.*, 2010), but which are now arguably so complex that they lack practical utility and thus remain firmly academic (Smith *et al.*, 2017).

Another example of this situation can be found with regards to safety culture. Although academics are keen to write about new frameworks or models to explain or improve safety culture (e.g., Cooper 2000; Choudhry *et al.*, 2007) or suggest ways of measuring or monitoring it (e.g., Probst *et al.*, 2019), such research can leave industry practitioners unsatisfied, fundamentally because what they seek is clear guidance on what safety culture is, how to measure it, and with what tools they can do so.

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This situation has been exacerbated in the US as regulatory agencies have begun to require annual safety culture assessments for compliance with regulations and the issuance of licences to operate (California Office of Energy Infrastructure Safety 2023). Such requirements often refer to other industries such as nuclear, where safety culture is generally considered to be a more well-established concept, however this is something of a misnomer. In fact, guidance from the International Atomic Energy Agency (IAEA 2016) on Performing Safety Culture Self-Assessments spends several pages unpacking their own definition of safety culture before suggesting highly complex mixed-methodological assessments best undertaken by experts in the field. Yet the very existence of such reports perpetuates the idea that there is an 'easy' way to measure safety culture, when in fact this is not the case. There are also many idiosyncrasies uniquely associated with the construction industry (i.e., the peripatetic workforce and constantly changing work environments) that make the creation and assessment of safety culture requisitely different from more stable industries such as nuclear or manufacturing. Yet while tools such as safety climate surveys (e.g., Alruqi *et al.*, 2018) or maturity models (e.g., Filho and Waterson 2018) are available for use, alongside myriad different definitions of safety culture that could be adopted, the academic context itself is so oversaturated and confusing (Deepak and Mahesh 2023) that safety professionals - perhaps unsurprisingly - may simply shy away from it.

While academics continue to research and publish studies addressing safety culture in construction, the actual extent of industry engagement is less clear and detailed understandings of the ways in which industry utilises safety culture as a concept are relatively limited. To better understand this situation and these relationships within the context of the US construction industry, exploratory interviews were undertaken with safety professionals to unpack their personal, organisational, and industrial perspectives in practice.

The term 'safety culture' has its roots in the post-accident review of the 1986 Chernobyl disaster, however - and perhaps rather unfortunately - its actual meaning or definition was left up to interpretation (IAEA 1986). Since then, research into this concept has grown and expanded both within the field of construction safety management and more generally. However, despite an ever-increasing body of work, there is little evidence of any forthcoming consensus about safety culture itself (Bisbey *et al.*, 2019). Indeed, that amongst the multitude of models, maturity models, assessment tools, theoretical frameworks, philosophical musings, and approaches for measurement and monitoring both safety culture and safety climate, the fact that there has yet to emerge a single accepted definition of safety culture (Deepak and Mahesh 2023) speaks to the complexities of this phenomenon.

When undertaking research of safety culture, it inevitably becomes a necessity for the researcher(s) to first set out which definition they have adopted for their study or paper. Yet such definitions range from the tangible actions of workers, e.g., the 'observable degree of effort by which all organisational members direct their attention and actions toward improving safety on a daily basis' (Cooper 2000), to the highly intangible values, attitudes, and beliefs that underpin such behaviours (Schulman 2020), with the more pragmatic notion of 'how we do things around here' (Hopkins 2018) adding a further level of abstraction to the mix. This level of disagreement on a single definition of safety culture results in a fragmented and incoherent body of work, one in which the empirical findings and data are difficult to compare thus limiting the scientific development of the field of safety science in regard to safety culture.

Philosophically, there are various models that underpin the concept adopting various levels of tangibility and intangibility, reflecting the diversity of definitions. As set out in Szabo *et al.* (2023), these span from the engineered and normative, to the analytical and pragmatic, to the emergent and socially constructed (after Silbey 2009, Guldenmund 2010 and Edwards *et al.*, 2013). Alternative perspectives conceptualise safety culture as a fundamental and embedded aspect of organisational culture from which it cannot be unpicked (Guldenmund 2000) with multi-level influences therein (Zohar and Luria 2005).

Such models and associated definitions of safety culture inevitably dictate the methods used for their research, and practical considerations may go some way to explain the dominance of the 'safety culture survey' and the measurement of more tangible leading and lagging indicators as such quantitative approaches are much less time consuming than qualitative methodologies such as ethnographies (Choudhry *et al.*, 2007) that would be needed to underpin emergent models and more intangible conceptualisations. However, different approaches have been found to result in very different evaluations of safety culture as Antonsen (2009) found through a comparison of qualitative and quantitative descriptions of the safety culture in the same organisation (a Norwegian oil and gas platform) and found them to be dramatically different, leading him to cast doubt on the predictive validity of safety culture assessments.

Safety culture was recently described by Bisbey *et al.* (2019) as 'an enigma that has plagued the literature with debate' and indeed the resultant body of academic work on the subject certainly reflects that evaluation. The volume of debate is considerable. There have been several meta-analyses of this literature in recent times (e.g., Guldenmund 2000; Bisbey *et al.*, 2019; Deepak and Mahesh 2023) which set out the complexities of the situation and as such another in-depth review is not included here. Instead, prominence is given to the empirical work carried out which sought to unpick the practical industry phenomenon of safety culture, rather than any academic constructs, and furthermore to explore the relationship between industry and academia in this space.

METHOD

Semi-structured interviews were conducted with 27 US-based construction safety professionals to further explore industry practices and perceptions around safety culture. A qualitative approach was adopted for this exploratory study, as it is best able to unpack the nuances and details around the concept of safety culture as mobilised in practice (Creswell and Creswell 2017). Whilst this sample is small, thus limiting the generalisability and external validity of these findings to other regions and industries, its purposive nature results in a high level of internal validity. The sample of professionals had an average of 16 years of experience working in safety and an average of 12 years of experience at the company they currently work at, with represented construction sectors spanning commercial construction, utilities, oil and gas and power generation. It can therefore be argued that not only do they have in-depth knowledge of their own company, but their responses regarding safety culture are likely to be shared by others within the industry due to their professional standing.

The interviews explored several aspects of safety culture, including individual and company definitions used, how safety culture is practically implemented in their organisation, and how they understand and apply various academic concepts of safety culture within industry.

All the interviews were carried out via Zoom to maximise participation from the geographically dispersed sample, recorded through that medium, transcribed verbatim, and subsequently coded and analysed thematically and for content with the assistance of NVivo to organise and store the data (Silverman 2017). This analysis unpacked the patterns and themes that arose across the interviews (Braun and Clarke 2012) and has been presented in narrative form to better discuss these patterns and themes, as well as to make complex connections between them (Creswell and Creswell 2017).

FINDINGS AND DISCUSSION

The most prominent finding from the analysis was, somewhat surprisingly, the consistency in the inconsistency found therein. Inconsistency could be found among the understandings of the safety professionals themselves, which often also included recognition of this messy situation; among the operationalisation and mobilisation of safety culture within the different organisations represented; and finally, among the ways industry makes sense of safety culture as compared to that found within academic research. The nuances of this inconsistency are unpacked in detail below. However, this finding perhaps raises more questions than it answers with regards to the practicality, utility and indeed continuing longevity of safety culture as both an academic and industrial concept for the improvement of occupational safety overall.

How Safety Professionals Define Safety Culture

“It’s a million dollar question I guess, right?”

At the organisational level, the US construction industry has not adopted any single definition of safety culture out of the dozens available in academic or grey literature. Among the safety professionals tasked with implementing new safety concepts there was a consensus that safety culture is variously the attitudes, values, beliefs, perceptions, behaviours, and/or actions of a group with regards to safety. This 'definition' reflects many different aspects that have been considered and discussed within academic work, but as a definition it is also arguably so broad as to be relatively useless for practice; as when something encompasses everything, it effectively becomes nothing. However, this also provides the insight that whilst academia continues to search for a perfect definition that will provide a way to readily operationalise safety culture, practitioners generally see safety culture in the broadest terms, fully aware that to define it otherwise is practically impossible. As one professional said:

“You think you know and then you, when you have to define it, you’re like, ‘well, wait’.”

The professionals' most shared definition leans heavily toward the intangible, which although also found within the literature (e.g., Fang and Wu 2013) in essence results in something that is not practically implementable, resulting in a concept that is difficult to pin down. The lack of a definition was highlighted as a significant concern for the professionals, not least because it makes safety culture a difficult thing to measure and in an operational field that has long relied on statistical measurement for its management (such as recordable injury rates or leading indicators), this creates practical problems for monitoring, reporting and control. There is inconsistency between how the professionals understand safety culture and how they are tasked with management in the field, and there has been no clear resolution yet found. In fact, it may be that there can be no consensus found on a definition of safety culture and that it might not be possible to create a single scientific definition for the concept.

As a result, many organisations have not only avoided adopting a company-wide definition of safety culture, but some have begun to avoid the use of the term 'safety culture' entirely:

"So we actually purposely do not [laughs] use the word safety culture...because there isn't a standard definition of safety culture and when you hear the word culture, everyone's sort of defining it differently."

"We tried many years ago...so many of our leaders and, and even employees had different definitions of what safety culture is. And so we've almost steered clear of actually using that term."

The professionals' belief that safety culture is difficult to define is consistent with academia, however the fact that organisations have decided to not only actively not adopt a definition for safety culture, but also seem to be moving away from the concept entirely is highly inconsistent with academia, where it remains an active area of research. If safety culture has become so bloated and confusing that industry has begun to stop interacting with it (AIHS 2019:14), then it may be time to consider moving on from safety culture or dissolving it into its 'component' parts for more specific analysis on their relationship to safety performance as opposed to 'safety culture' as a whole. Academics should endeavour to work with industry to ensure their research outputs have practical applications.

The Usefulness of Safety Culture

There are conflicting feelings, and again inconsistency, amongst the safety professionals regarding the utility of safety culture in the field. Perhaps unsurprising given the nature of the concept, it can be considered both useful and not useful at the same time, as illustrated by these three quotes:

"I think [safety culture] gives us a framework to provide clarity. It's difficult and it's abstract at best to, to many people."

"I think it is a useful concept. Um, I think the hard part is the idea of putting it in a box."

"It's a tool, um, that can be used to, to see where you're at. But as far as quantifiable, not very much so, I don't think so."

This sentiment, that safety culture is simultaneously useful, yet difficult to understand and unquantifiable was seen across the responses from the professionals. The exact reasons for its usefulness were often vague or assumed a situation where the safety culture was positive, and therefore it was the positive safety culture that was itself useful. Safety culture was also said to be useful because "we all talk about it" and "it connects people to the idea," however this in and of itself is inconsistent and even contradictory; because there are simply so many different definitions of safety culture that practitioners and academics cannot presume shared understandings.

The notion that safety culture could be useful was also found within the data, implying that although it is not useful in its current state, there is the potential for that to change if only it was utilisable. This illustrates a common desire of the safety professionals for safety culture to make a positive contribution to safety management (in some way as yet undefined), but problems of practicalities are currently unsurmountable. This was further evidenced in the data through discussions of the measurement of safety culture. A rare element of consistency was found in the shared conclusion that there was no good way to measure safety culture currently being used on jobsites, and measures that are employed do not explicitly seek to measure safety culture itself. At present, an inconsistent patchwork of the measurement of myriad different safety

indicators have been adopted across the industry. Each organisation measures safety, often in multiple different ways, but none are specifically or explicitly related to measuring safety culture. Even for the most consistently used measurement strategies, there is very little consistency in the exact ways they are employed, depending on the company, the business unit or even the region of operation. For example, even though every company said they use leadership engagements as a leading indicator of safety performance (Xu *et al.*, 2023), and leadership engagement is a common element of safety culture in academic constructs (Deepak and Mahesh 2019), the level of formality, how strongly they are enforced, and what they exactly consist of remain highly inconsistent across companies. Even the definitions for the various measurement strategies discussed by the professionals were not consistent, depending on the individual.

It's Organisational Culture, Stupid

The lack of consistency across the different organisations regarding their approach to safety culture is likely influenced by the lack of a clear definition and useful operational tools. A notable consequence of this in practice was the repositioning of safety culture as firmly within the wider culture of the organisation, rather than its consideration as a discreet concept. This was often associated with various other safety initiatives and programs, which by their own approaches to safety management suggest this more holistic approach. For example, several of the organisations were heavily involved with the concept of psychological safety which is applied to the organisation. Thus, safety culture inevitably becomes part of organisational culture, and safety in turn becomes relevant across all functions of the organisation and its leadership.

"There's not a lot of conversations using that word, safety culture, exactly. It's more of, I guess, uh, building safety into the operations and the overall culture... Those ideas and values become internalised and driven by the operations personnel."

This is reflected in how many US construction companies position safety generally within their operations: that safety 'drives everything that we do'. This approach was exemplified by this professional:

"Our approach to safety culture is our approach to everything we do. It's buying the hard hat with the softer brim in the front because these people are out there wearing it every day. That's not safety culture, that's culture. That's who you are."

Many US construction companies approach safety culture by focusing on their overall culture, with safety as a priority therein. By doing this, they believe that a positive safety culture will follow, neatly sidestepping many of the issues with safety culture when applied as a concept on its own, as one professional remarked:

"The end goal is that it becomes internalised."

Therefore, safety culture for some firms and professionals is not a distinct concept, but the culture surrounding everything done in a company. It is the organisational context that drives the behaviour in the field, or 'a by-product or subculture of organisational culture'. This finds synergy with the more emergent academic considerations of safety culture (e.g., Guldenmund 2000; Choudhry *et al.*, 2007; Antonsen 2009) but also broadens the field for analysis. To best move forward, it may be that academics should firmly plant safety culture under the umbrella of organisational culture and look upstream in the organisation for alternative ways of measurement and evaluation.

Ships That Pass in the Night: Climate and Maturity

Two common aspects of safety culture found within the academic literature interestingly did not find similar prominence within the data elicited from the safety professionals; these were safety climate and culture maturity models.

Safety Climate

The term 'safety climate' is not a commonly used term in the US construction industry according to our interviewees. Even those companies that utilise regular safety climate surveys do not otherwise use the term 'safety climate' in their operational safety management. This is interesting as safety climate is the only aspect of safety culture that has been academically validated as having a direct relationship with overall safety performance (Alruqi *et al.*, 2018). On reflection, this is unsurprising as a climate survey is a worker opinion survey, and so if your workers think there will be an accident soon there probably will be, and unfortunately very often is. Yet this concept creates more confusion in the field. As one professional explained, their company once tried to create separate definitions for safety culture and safety climate, but it proved futile:

"It got so muddy trying to dive into those two things, we kind of abandoned [them]."

In a situation where the prevailing term 'safety culture' is so nebulous and difficult to understand, introducing another term like climate does not, it seems, alleviate the confusion at all. Instead of providing clarity, the term 'safety climate', although necessarily precise and with a generally agreed definition, serves only to further complicate and confuse things:

"There's no definition for safety culture, like I mentioned, and it's- the term itself is not used very widely. And so safety climate is even less important, if at all."

Some companies do use the term 'safety climate', but only by the safety professionals with several years of experience and their teams. They understood it to focus on worker attitudes, feelings, and perceptions at 'a snapshot in time' and that it can be used to measure safety culture. Others described it as a 'mood' or having the capacity to be hot or cold. Fieldworkers and other employees tend to not use the term at all, due in large part to a lack of understanding. As one professional noted:

"The general population ... I don't think they understand the word culture sometimes, so they don't use the word climate either."

Those that said their company does use the term safety climate said that it is often used synonymously with safety culture by most of the employees. A few of the safety professionals themselves even noted that they personally saw no clear distinction between the terms climate and culture or were simply not familiar with safety climate as a concept at all.

"We use the concept of climate interchangeably with culture. They are the same thing to me."

Despite safety climate surveys being a commonly referenced tool for measuring safety culture in the construction industry (Alruqi *et al.*, 2018), there was a high level of inconsistency among the organisations interviewed regarding what those surveys look like, their frequency, or even whether they are undertaken at all. These surveys are often not safety culture centric and may only have a small section dedicated to questions regarding safety culture/safety climate. Some types of surveys mentioned include safety culture surveys, safety climate surveys, pulse surveys, satisfaction surveys, perception surveys, engagement surveys, etc. The timing with which surveys

are undertaken was also inconsistent; it may be annually, semi-annually, bi-annually, or with no fixed or consistent frequency or schedule. This finding is somewhat inconsistent with the prominence safety climate is often accorded within academic research of safety culture. It suggests that measurement through surveys in practice is more bespoke than consistent, likely with a reliance on consultant provided tools, despite academic validation of the relevant safety climate components readily available for use in practice (Alruqi *et al.*, 2018).

Maturity Models

Another inconsistency between industry and academia as well as across the companies interviewed is which, if any, of the myriad safety culture maturity models that have emerged from academia or consultancy (Filho and Waterson 2018) they utilise in practice. Simply put, most companies do not use a maturity model to assess or improve their safety culture. Only five out of the 27 companies involved in the study use a safety culture maturity model consistently. Yet there was no consistency among these five companies, as each used a different maturity model in their organisation. Six other companies occasionally use maturity models during trainings or have investigated a maturity model, but do not currently integrate it into their operations. In total, six different maturity models were mentioned, along with nine other frameworks or non-maturity models. Some of these models come from academia, such as the HSE Culture ladder (Hudson 2007), while others come from consultancy, such as the Dupont Bradley Curve and the Clive Lloyd model (which is an updated version of the HSE Culture ladder).

Considering that the prevalence of safety culture maturity models has increased over the last two decades within academia (Filho and Waterson 2018), it is important to note that they have yet to achieve widespread adoption in the construction industry. Furthermore, where they have been adopted, there is very little consistency in how companies are choosing which maturity model to use. Indeed, some opt to combine 'bits and pieces' of multiple models, while others choose to create their own in-house, reiterating that academia and industry in this aspect of safety culture research really are ships that pass in the night.

CONCLUSIONS

This study sought to unpack how the US construction industry uses safety culture in the field, and the shape of the relationship between industry and academia in this space. Findings revealed that much of the academic research in the realm of construction safety culture is not effectively reaching industry for utilisation.

There is inconsistency between the two in terms of what is prioritised and what is not, notably the lack of industry engagement with climate surveys (as a component of safety culture measurement) and maturity models despite the volume of academic work behind both concepts. The lack of a clear definition appears to be a fundamental stumbling block for industry, as it also is for academia, as it severely limits its utility in the field. Indeed, this is so problematic that some organisations are deliberately avoiding any mention of 'safety culture' within their safety management programs. This suggests that unless an agreed definition can be secured, and soon, safety culture should perhaps be abandoned. An alternative approach for academia (and ultimately industry via the application of findings) would be to focus on its 'component' parts, such as safety climate, which does have a validated relationship with safety performance and so is a more useful metric for management. There is also scope to better empirically research familiar 'components' such as 'engagement' and

'commitment' independently, using appropriate methodologies defined for such work rather than attempting a one-methodology-fits-all approach to a bundled-up concept of 'safety culture'. This could also leverage the fact that some firms have subsumed safety culture into their organisational culture, which opens new avenues for research able to start afresh within this restructured space, including the creation of new frameworks focused more on how organisational context influences worker behaviour in all aspects, including safety.

Indeed, as safety culture in the US construction industry is most consistent in its inconsistency, the argument could be made that the concept itself simply has too much baggage to ever become operationally effective in the field. Academics and safety professionals should instead work more closely together to develop well-defined concepts around safety and tools that are able to effectively measure performance in practice. Such co-creation would enhance both the validity and utility of the work, which could then in turn underpin enhanced regulatory frameworks for evaluation and even policy changes seeking to improve construction worker safety overall.

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