

FORESEEING COUNTERMEASURES FOR CONSTRUCTION SAFETY VIOLATIONS IN SOUTH AFRICA

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Human failure (errors and violations) studies from the sub-Saharan African region are limited. While non-compliance (violation) is cited as a causal factor in reported incidents and accidents, countermeasures are lacking in how safety research is understood in the region. Through research methods that used a semi-structured questionnaire for face-to-face interviews, perceptions of site management and workers were collected. Routine violations outnumber other cited failure types in the study, where the violations and their causes are either unclear or are misunderstood by some people in the front line of construction worksites. Examples of reported violations by the interviewees include working on a site that allows “fist fights” and “racial slurs”. The lax attitudes of contractors, the ignorance (arrogance in certain instances) of workers, and the ineffective site inspectorate regime have made violations the norm on the visited projects. There is a clear case for measures that will tackle problems with rules found on the visited sites. Problems with rules on the sites are systemic, since they occur at both organisational and individual levels. For example, site management professionals and workers blamed each other for safety violations. Problems with rules have rendered induction and toolbox talks ineffective in the sampled projects. The paper thus argues for deployment of countermeasures that will improve risk perceptions of contractors and their workers, so that adequate understanding of safety violations and their consequences on construction sites is created. Use of countermeasures also requires a clear implementation strategy to avoid redundant decisions and actions, which will manifest if “problems with rules” are left unchecked.

Keywords: compliance, construction, safety, site work, violations

INTRODUCTION

Deliberate non-compliance is prevalent in poorly controlled workplaces. Several definitions of safety violations exist in the literature. Alper and Karsh (2009) commented on eight various definitions of violations. For the purposes of this paper, a safety violation is defined as a premeditated departure from rules, procedures, instructions, and regulations specified for efficient workplace operations. It is an intentional failure recorded when a worker deliberately does the wrong thing. In his seminal book ‘Human error’, Reason (1990) explained that violations are committed for many reasons. If the violation is deliberate, investigators must examine prior intention to cause harm. If prior intention to cause harm is established, such violation

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can be categorised as sabotage (malevolent). In contrast, if prior intention to cause harm cannot be established (non-malevolent), the violation should not be of great concern (Reason 1990). Reason (1990) made a further distinction, namely deliberate but non-malevolent non-compliance, which he categorised into ‘routine violations’ and ‘exceptional violations’. Another category of violations was distinguished, namely ‘situational violations’ (Reason 2008). Of these three types of violations, this paper addresses routine and situational violations that are common in construction incident reports.

Safety violations in the project environment, for example, often arise from systemic problems in the workplace (Lingard, Pink, Hayes, McDermott and Harley 2016). For example, when people assume different roles on a project site based on their health and safety (H&S) tendencies influenced by time and work pressures, level of experience, risk perceptions, and safety culture (Choudhry and Fang 2008; Oswald, Sherratt and Smith 2013), unsafe acts and conditions could eventuate. In South African construction, where there is a paucity of research literature that investigates deliberate violations without malevolence in worksites, factors such as the perceived benefit of violation, outlined by Reason (2008) in Table 1, have continued to harm people (Emuze and Smallwood 2012a, 2012b; Emuze, Van Eeden and Geminiani 2015). Contractors and their employees reportedly embark upon deliberate violations in the mentioned South African citations because of a perceived shortcut (easier way of working), perceived savings in time (and cost of labour), the need to meet tight deadlines, and the tendency to want to show that the industry is masculine. These short-sighted benefits are implemented after people weigh up the perceived cost and the perceived benefits of an act of violation and they come to the conclusion that the perceived benefits exceed the perceived cost. When people make such a decision, they are likely to violate rules and procedures (Battmann and Klumb 1993).

Table 1: Reason’s balance sheet for violation. Adapted from Reason (2008: 58)

Perceived benefits of violation	Perceived cost of violation
Easier way of working	Causes accidents
Saves time	Injury to self or others
More exciting	Damage to assets
Gets the job done	Costly to repair
Shows skill	Sanctions/punishment
Meets a deadline	Loss of job/promotion
Looks macho (masculine)	Disapproval of friends

In addition, the dominant narrative that violations are perpetrated by “bad” people, with the “bad apple theory” of Dekker (Dekker 2006) embedded in a workplace, may explain the paucity of studies on deliberate non-compliance and its causation in the industry. However, recent case studies on accidents in South Africa are bringing several issues around human failure into the research spotlight. For example, a building collapse that recorded two fatalities and 29 severe injuries in Durban, South Africa, provides evidence of deliberate non-compliance by the developer, the contractor, the engineer, and workers on the project (Emuze, Van Eeden and Geminiani 2015, 2017).

Media reports on more recent accidents equally attest to the need to conduct studies on safety violations in the South African context. In essence, this paper reports on a preliminary assessment of safety violations on several construction sites, so that countermeasures required for contextual support can be deliberated and examined. The next section of this paper presents a succinct explanation of the research method of the study. After the section, the results and interpretations of the study are used as the basis for a discussion on countermeasures required to halt the proliferation of safety violations on construction sites.

RESEARCH METHOD

To achieve the research goal, a phenomenological study was conducted using construction sites as the location of primary data collection. The use of an interpretive qualitative perspective assisted the study in the sense that data collection was done based on the social and contextual beliefs of the participants. The study thus conforms to the notion that qualitative research is a situated activity that locates the observer in the world (in the case of this study a construction site) (Denzin and Lincoln 2008).

The research consists of interpretive practices that make the world visible through interviews, conversations, photographs, recordings, or field notes (Denzin and Lincoln 2008). Interviews, conversations, and field notes were the only tools used in this reported study. The interviews were expedited using a semi-structured questionnaire protocol that elicited information from both site management and general workers. The interviewees were requested to respond to questions such as “What is your understanding of safety violations?”, “What are the root causes of violations?”, and “What violations have you encountered on-site?” All the interviews were face-to-face, and they were all tape-recorded and transcribed.

To promote stronger substantiation of constructs and working propositions, the study utilised multiple investigators to collect data from sites in three provinces of South Africa. Use of multiple investigators with the same instrument enhances the creative potential of the study, while ensuring convergence of observations from them to improve confidence in the results (Huberman and Miles 2002). As such, the author used three final-year Bachelor of Technology students registered for the research subject to collect the primary data, which was predominantly textual in nature.

The thematically analysed data serves the purpose of illuminating the phenomenon (safety violations) as lived experiences of the interviewees. According to Huberman and Miles (2002), an interpretation must illuminate or bring alive what has been studied. They go on to say that illumination occurs only when the interpretation is based on data that is collected from the world of lived experiences, as “unless ordinary people speak, we cannot interpret their experiences” (Huberman and Miles 2002: 362).

Tables 2 to 4 summarise the demographic and general information of the participants in the three South African provinces of Gauteng, the Free State, and the Eastern Cape. The tables show that both site management and general workers participated in the study. In the Gauteng province, 2 sites were visited. One of the sites was a pipe installation site, and the other site was a construction site for a two-storey office block. A semi-structured questionnaire was prepared to obtain responses from general workers through one-on-one interviews.

From the site where the two-storey office block was being constructed, 6 general workers participated in the study. From the pipe installation site, 9 general workers were selected by their managers to take part in the study. From this site, 7 site management-level professionals participated in the interviews. In total, the responses from general workers numbered 15, and the responses from site management were 7, in Gauteng. The occupations of the interviewees in the sites visited in Gauteng included machine operator, H&S officer, and others outlined in Table 2, and most of the participants had more than five years of construction industry experience.

Table 2: Gauteng interviewees' demographic and general information

Occupation	Site experience in years				Know it			Violation Know causes		
	0-5	5-10	10-30	>30	Yes	No	Unsure	Yes	No	Unsure
Machine operator		1					1			1
H&S officer	1	1	1		3			3		
Concrete hand			1			1		1		
Scaffolding erector		2			2			2		
Steel fixer				1			1	1		
Safety representative	1				1			1		
General worker	4	2			2	1	3	4	1	1
Storeman	1						1			1
Bricklayer	1						1			1
Quality control engineer			1		1			1		
Quantity surveyor			1		1			1		
Construction manager			1		1			1		
Environmental officer	1				1			1		
Foreman				1	1			1		
Sub total	9	6	5	2	13	2	7	17	1	4
Total				22				22		22

The fieldwork conducted in the province of the Eastern Cape was only able to collect data from professionals occupying site management positions in the sites visited, where unstructured observation access was granted in most cases (see Table 3). Apart from one interviewee, all the participants in the province had been in the industry for more than five years. In the Free State province, 10 interviews were conducted with 8 professionals and 2 general workers, who could not participate using the English language. With the use of an interpreter, an unstructured conversation was conducted with the general workers, as is indicated in Table 4.

Table 3: Eastern Cape interviewees' demographic and general information

Occupation	Site experience in years				Know it			Violation Know causes		
	0-5	5-10	10-30	>30	Yes	No	Unsure	Yes	No	Unsure
Quantity surveyor	1	1			1		1	1	1	
Construction manager		1	1		2			2		
H&S consultant		2	1		3			3		
Site manager		1				1				1
Sub total	1	5	2	0	6	1	1	6	1	1
Total				8				8		8

FINDINGS AND INTERPRETATIONS

Table 2 shows that seven of the interviewees in Gauteng were “unsure” of what constitutes a violation, but only four of them were also unsure of the causes of violations. The table also indicates that 17 of the interviewees had opinions regarding the causes of violations, but only 13 could explain a violation. There is consistency, with the general worker clearly saying he does not understand what constitutes a violation, and he does not know the causes of violations. By contrast, the one concrete worker who said he does not understand what constitutes a violation ended up saying that he knows the causes of violations. The contradiction between those that understand the phenomenon and the ones that confirm their knowledge of it suggests that there is a difference in the minds of the interviewee cohort, particularly among the general workers.

Table 4: Free State interviewees’ demographic and general information

Occupation	Site experience in years				Know it			Violation		
	0-5	5-10	10-30	>30	Yes	No	Unsure	Yes	No	Unsure
Construction manager	1	2			3			2		1
Production manager	1				1			1		
Site agent			1		1			1		
Site foreman	2	1			3			2		1
General workers			2			2			2	
Sub total	4	3	3	0	8	2	0	6	2	2
Total				10			10			10

Table 3 indicates that a site manager, who should know construction regulations and the required H&S expectations on sites, contended that he did not understand what constitutes a violation, while a quantity surveyor was unsure of it. While the quantity surveyor did not know the causes of violations, the site manager was unsure of them.

Again, these two responses arouse curiosity regarding the knowledge and competencies of the concerned professionals. In sites visited in the Eastern Cape, however, there was consistency between those that confirmed their knowledge of what constitutes a violation and what causes violations. In the Free State province, the different occupations understood what is meant by a violation, although two of them were not sure of what causes violations (see Table 4). The two general workers that were interviewed said they did not understand what constitutes a violation, and they could not comment on their causes. In brief, the majority of the interviewees had experienced violations.

In the interviews, violations where both workers and management were agents were mentioned. The interviewees experienced different violations on their different sites, and the Gauteng interviewees who indicated that there were no violations on their site were not being truthful. The research investigator determined that the responses of these interviewees were not entirely true, because on one construction site that was visited for observation it was instructed to suspend work due to non-compliance over working conditions. This information was provided to the researcher by the site manager, but the construction manager from the same site did not disclose this information in the interview. The observation is deemed to represent a failure of being truthful on the part of the construction manager. The interpretations of how the

interviewees understood what constitutes a violation and the causes of violations are described below.

Theme 1: Understanding of what constitutes a violation

Over the years, violations have been linked to injuries and fatalities in the construction industry. Despite occupational health and safety (OHS) regulations and labour laws being in existence, the construction industry remains dangerous, with statistically alarming rates of fatalities and injuries. Of all the interviewees in Gauteng, only 13 understood what constituted a safety violation. The researchers had to explain to the general workers what the word “violation” was in the applicable vernacular language before they could answer the questionnaire, as some of them were unclear about it. Overall, most of the general workers were aware of what the basic requirements relating to a safe working area are. This speaks to the “yes” under the “Aware of causes of violations?” column in Table 2. The main source of their knowledge is the daily toolbox talks used to create awareness concerning a safe working area. Although some workers opined that their management always fail to provide appropriate personal protective equipment (PPE) when it is required, in the form of earplugs and dust masks, their site management colleagues were of the opinion that workers tend to commit violations because they fail to listen to and apply suggestions from toolbox talks. In the study, site management interviewees indicated that some general workers committed violations by coming to work under the influence of substances such as alcohol and drugs, which impair their alertness and concentration on worksites.

As mentioned earlier, translation into vernacular languages was necessary for the general workers to answer the questions, since it was evident that English was a language that was not fully understood by them. In this regard, one respondent articulated that the lack of education and information comprehension among the general workers has led to his experience of violations on construction sites. Therefore, inasmuch as there are toolbox talks daily, they may be futile if the recipients do not have full understanding of what is being communicated. Regarding factors that cause violations on-site, certain general workers noted that site factors such as an unsafe working environment and lack of communication result in violations on the construction site.

Another factor that stood out was communication between the workers. The communication factor was not about language comprehension. It was about the fact that the workers would not talk amongst themselves in an atmosphere of conflict or negative competition. The reported lack of communication can lead to conflicts and misunderstandings, which could produce safety violations. The interviewees also articulated that some violations are brought about by the workers not listening to instructions. They reasoned that this was because the workers think they know a lot based on the amount of experience they have had in the construction industry.

Theme 2: Causes of violations on worksites

From the feedback received it was shown that most workers had no knowledge of what a violation is, let alone the root causes of violations, and what constitutes a violation. A major conclusion derived from the general workers indicated that their lack of skills and training contributes to safety violations. In an interesting conversation with some unskilled workers on-site, their limited knowledge of violations stood out. The workers were generally left to carry out their daily tasks in whatever way they perceived was right. Taking an overview of the perceptions

expressed by both management and workers together, the shifting of blame over responsibilities that emanated from both sides is cause for concern. Apart from issues around skills and training, lack of adequate financial provision for H&S was also mentioned as a cause of violations.

Safety-related resources such as protect gears and clothing are an essential component of project financing. An issue mentioned by a manager related to cutting expenses to increase profitability over the duration of the project by any means possible. As a result, workers lacking PPE go to work on-site with marginal training. Violation is said to also occur due to productivity-based decisions and actions. For instance, interviewees opined that in efforts to push for greater production on-site, long working hours become the norm for contractors, who disregard regulations concerning working hours for the workforce. These long working hours are perceived as a violation, which triggers further violations. Long working hours leads to stress and impaired mental health, which could lead to accidents on sites. In particular, the study observed that working in confined areas without appropriate PPE is permitted on a site. This was a concern raised in the study. However, it appears that such conditions are deemed as workable site challenges by the interviewees and their employers due to a fixed low project budget.

At the organisational level, fatigue from working long hours without rest, a lack of H&S and work method knowledge, allowing workers to work without the required knowledge and skills, stress, provision of faulty machinery, lack of adequate training opportunities for workers, mandating the use of unsafe scaffolding, allowing the use of unsafe power tools, use of uneducated or uninformed persons on sites, failing to mitigate the effects of language barriers in communication in a multicultural workplace, unfair production pressures allowed by workers, mandating after-hours work without adequate technical and safety supervision, haphazard scheduling for toolbox talks, allowing disputes between contractors and workers to escalate, asking workers to work without the required PPE, such as helmets, earplugs, and dust masks, and not providing required signage as well as barricades for deep excavation are the causes of violations highlighted in the study.

At the individual level, the major causes mentioned by the interviewees include the lack of attention to toolbox talk details by workers, people who work on-site taking things for granted because they think they know it all, not wearing PPE because people refuse to listen to instructions, not following what has been said in inductions, jumping over trenches instead of going around them, climbing heights without a safety harness, negligence of supervisors on-site, and making racist comments. An interviewee said that “ignorance, arrogance, stubbornness and complete disregard for order” underpin most violations that he has encountered on sites. Another interviewee cited an incident where a white man called his fellow black worker “a monkey”, which he claimed was a recipe for violations on-site.

It is also important to highlight the view that when a case of misunderstanding and ill treatment occurs, workers tend to violate rules set by management on the site. As an illustration, two interviewees cited instances of “fist fights” on sites, and one such incident involved two ladies physically fighting each other on-site. A quote from an interviewee sums up the causes of violations at the individual level. The interviewee made several comments and summed them up by saying “[w]orkers fail to comply with regulations where there is no system used within the company forcing them to comply”.

DISCUSSION

Further results from the interviews show that toolbox talks once a week and inductions for workers and site visitors are ways in which participants have been tackling violations on their projects. However, these two measures have failed to stem the tide of violations among the interviewee cohort. Indeed, it appears that safety violations have managed to slip through in spite of inductions and toolbox talks. In other words, the industry in South Africa is in need of credible countermeasures directed at reduction and complete elimination of safety violations on the worksite.

The discussion in this section is an attempt to conceptualise countermeasures that are suitable for the identified violations in this study. The previous section of the paper alludes to the fact that most of the interviewees confirm that violations occur on their sites. The interviewees went on to cite various types of human failure. In particular, the interviewees commented on violations that are viewed as the norm in the industry. These routine violations involve rules and regulations that are ignored by workers and their employers (contractors).

The consensus regarding non-compliance with some of the rules is ineffectiveness of the inspectorate functions of the Department of Labour (DoL) in South Africa (Geminiani, Smallwood and Fee 2013; Geminiani and Smallwood 2008). The human failure-related toolkits from the Health and Safety Executive (HSE) in the United Kingdom (UK) suggest appropriate countermeasures for routine violations. For example, it is crucial to create responsible and effective supervision of work on-site, in addition to the inspectorate functions of the DoL. Not only should the DoL flag and sanction contractors that demonstrate non-compliance with registration of workers with the Compensation Fund for example, it should also be able to influence the risk perceptions of contractors.

Influence on the risk perceptions of contractors could, in turn, raise the standard of work supervision on sites. Some cited examples of violations by the interviewees are categorised as situational violations, because they are determined by context-specific factors. Such factors are not limited to time pressure, workload, and inappropriate tools and plants, which should not happen if an organisation is keen to promote a positive safety culture. In such situations, the workers opined that tasks have to be completed in an atmosphere of non-compliance. It is therefore appropriate to avoid situational factors, such as unnecessary time and work pressures due to production requirements on construction sites. There is also a need to acknowledge that the site management and the workers have problems with complying with rules, a situation that is not easy to interpret at this stage of the research.

CONCLUSIONS

Beyond the concerns around the extent of knowledge about violations among the interviewees who were busy on live projects in 2017, the nature of violations cited in the research demands critical thinking. At the organisational level, contractors are guilty of non-compliance with legislation when they, among other things, fail to register their workers with the Compensation Fund. The level of commitment of contractors to safety on their sites is also in the spotlight, as proper induction is not being done. Relying on safety induction and toolbox talks (which are few and far between) to tackle safety is inappropriate. Although this study was conducted using a qualitative approach, which does not allow for statistical generalisation, the efforts made to strengthen the results, through the use of multiple field investigators on

several project sites in three provinces, give credence to the argument that both routine and situational violations may be commonplace in South African construction. The results also suggest that there may be a link between these violations, problems with rules, and lax enforcement. There may equally be a link between these violations and the level of commitment of construction contractors to safety.

While the desired state would be one where performance is driven by a positive safety culture, the existence of the aforementioned violations suggests that countermeasures have to be monitored closely. A step in the right direction would be appointment of qualified full-time safety professionals on project sites, irrespective of the size of the project. The current use of project size to determine whether safety professionals are appointed is not effective in an industry where routine and situational violations may be pervasive. The cost of such appointment is less than the cost of accidents or fatalities. In essence, clients should take the lead, by making adequate financial provision for compliance-based safety.

Finances should cover deployment of required safety professionals and other items highlighted in the project safety plan. However, the countermeasures would be better implemented if contractors have a need to avoid a penalty, rather than paying fines. The problems with compliance with rules should also inform the decisions of the DoL. These suggestions would, however, be validated through additional future evidence and data on violations in the construction industry. Given that theory-building research usually employs multiple data-collection methods, it can be argued that there is a need for this research to continue through other methodological and sample choices. Further studies should involve interviews, observations, archival sources, and surveys, so as to provide stronger evidence around the problem areas and the needed countermeasures in the industry. Future studies should aim at contributions to knowledge that are usable in practice through policy interventions and implementation.

ACKNOWLEDGEMENTS

In developing this paper, the author has drawn on research work assigned to his students in 2017. The author gratefully acknowledges Nyiko Baloyi-Sindane, Maumane Maime, and Nkcubeko Mpahlwa. The contributions of the two anonymous reviewers of the abstract and the paper are also appreciated. This paper was language-edited by a freelance language editor, Anthony Sparg. He has edited several academic journal articles in the field of construction management. He has an MA *cum laude* in African Languages (isiXhosa), an MA *cum laude* in Linguistics, and a Higher Diploma in Education.

REFERENCES

- Alper, S J and Karsh, B-T (2009) A systematic review of safety violations in industry. *Accident Analysis and Prevention*, 41(4), 739-54.
- Battmann, W and Klumb, P (1993) Behavioural economics and compliance with safety regulations. *Safety Science*, 16(1), 35-46.
- Choudhry, R M and Fang, D (2008) Why operatives engage in unsafe work behavior: Investigating factors on construction sites. *Safety Science*, 46(4), 566-84.
- Dekker, S (2006) *The Field Guide to Human Error*. Bedford, UK: Cranfield University Press. Available from <http://www.leonardo-in-flight.nl/PDF/FieldGuide%20to%20Human%20Error.PDF> [Accessed 20 March 2014].

- Denzin, N K and Lincoln, Y S (Eds.) (2008) *Collecting and Interpreting Qualitative Materials 3rd Edition*. Thousand Oaks, CA: Sage.
- Emuze, F and Smallwood, J (2012a) Construction motor vehicle accidents in South Africa: Preliminary findings. In: Behm, M (Ed.) *CIB W099 International Conference 2012: Modelling and Building Health and Safety*, 10-11 September, Singapore, 203-8.
- Emuze, F and Smallwood, J (2012b) Perspectives on health and safety in construction and design. *Proceedings of the Institution of Civil Engineers - Management, Procurement and Law*, 165(1), 27-33.
- Emuze, F, Van Eeden, L and Geminiani, F (2015) Causes and effects of building collapse: A case study in South Africa. In: Behm, M and McAleenan, C (Ed.) *CIB W099 International Health and Safety Conference*, 9-11 September, Belfast, UK, 407-16.
- Emuze, F A, Van Eeden, L and Geminiani, F (2017) A South African case study on the causes of building collapse. *Journal of Construction*, 10(4), 11-28.
- Geminiani, F and Smallwood, J (2008) A critical review of the effectiveness of the Department of Labour (DoL) Occupational Health and Safety (OH&S) Inspectorate in relation to the construction industry in South Africa. *Acta Structilia*, 15(2), 5-28.
- Geminiani, F, Smallwood, J and Fee, S (2013) A comparative analysis between contractors' and inspectors' perceptions of the Department of Labour Occupational Health and Safety Inspectorate relative to South African construction. *Safety Science*, 53, 186-92.
- Huberman, M and Miles, M B (Eds.) (2002) *The Qualitative Researcher's Companion*. Thousand Oaks, CA: Sage.
- Lingard, H, Pink, S, Hayes, J, McDermott, V and Harley, J (2016) Using participatory video to understand subcontracted construction workers' safety rule violations. In: Chan, P W and Neilson, C J (Eds.), *32nd Annual ARCOM Conference*, 5-7 September 2016, Manchester, UK. Association of Researchers in Construction Management, 457-66.
- Oswald D, Sherratt F and Smith S (2013) Exploring factors affecting unsafe behaviours in construction. In: Smith, S D and Ahiaga-Dagbui, D D (Eds.), *Proceedings 29th Annual ARCOM Conference*, 2-4 September 2013, Reading, UK, Association of Researchers in Construction Management., 335-344.
- Reason, J (1990) *Human Error*. New York: Cambridge University Press.
- Reason, J T (2008) *The Human Contribution: Unsafe Acts, Accidents and Heroic Recoveries*. Farnham, UK: Ashgate.