

Safety practice

Institutional cultures and their influence on loss prevention — for good or bad

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Summary

Organisational attitudes to health, safety and comfort in the workplace can have a significant influence — for better or worse — on loss prevention. This is discussed with reference to some tragic major accidents that have happened in the past and one much more recently. Conversely, reference is also made to situations where a rigorous approach to safety management — a good "safety culture" — has paid dividends in terms of a reduction in accident rates, often accompanied by increased profitability. The manner in which these adverse attitudes sometimes stem from interpretation of legislation, the very instruments which should protect the workforce, is illustrated by the investigations into the major accidents. Finally, some information on how a good safety culture can be developed is presented or referenced.

Keywords: Safety management, culture

Introduction

A previous article¹ described a tragic accident at the Hamlet chicken processing plant in North Carolina in which 25 workers lost their lives in a major fire. Underlying causes for this tragedy included serious managerial and institutional shortcomings in working practices, management/workforce relations and working conditions. It became clear from study of this accident that such shortcomings were, by no means, confined to this particular case. Other major industrial accidents have been caused by similar and related factors and there is evidence that the potential for future accidents still exists. A detailed treatment of the Hamlet fire can be found in reference 2.

A major fire in a garment production factory is described and analysed. It occurred in the Triangle Shirtwaist Factory in New York in 1911. A total of 146 workers were killed and, although it occurred over a century ago, the lessons learned are still applicable today. It is rightly dubbed "The Fire That Changed America" in the excellent book that was written on the subject³ and in the readily available references in the media.⁴

Moving forward to modern times, the fire at the Tazreen Fashion Factory in Dhaka, Bangladesh in 2012 is said to have led to numerous reforms in workers' rights and safety laws in Bangladesh. This tragedy resulted in at least 117 fatalities.⁵

In 1958, at the Our Lady of the Angels school in Chicago, a fire claimed the lives of 92 children and three nuns. It exemplifies the potential dangers that can arise from invoking the "Grandfather Clause" whereby older establishments are

exempted from modern safety innovations instead of being subject to a rigorous safety assessment carried out to the standards of the day.^{6,7}

The legislation and processes needed to drive forward a change in attitudes, practices and controls in the building of multi-storey workplaces such as those involved in all these accidents, are discussed against the background of the report of the inquiry, led by Dame Judith Hackitt, into the Grenfell Tower fire. As is now well known, basic and foreseeable building design and installation faults were a major factor leading to the outcome of this tragedy and deep-set organisational practices allowed these to take place.^{8,9} Finally, recognising that change for the better will never be achieved solely by legislative pressure, a brief summary of safety culture change and its beneficial effects on loss prevention is presented and illustrated by some examples.^{10,11}

The incidents themselves

The Triangle Shirtwaist Factory fire

The Triangle Shirtwaist Factory occupied the eighth, ninth and tenth floors of the Asch Building in Manhattan, New York. A "shirtwaist" was a type of women's blouse that was extremely popular at all levels of USA society at the time and numerous factories in New York and other parts of the USA manufactured them in factories that were little better than sweatshops, employing predominantly female labour. On 25 March 1911, a major fire broke out in the factory resulting in the deaths of 146 workers — 123 women and 23 men — who died from burns, smoke inhalation or from jumping from the high levels of the building in desperate attempts to avoid being burned or suffocated.

The fire started in a scrap bin under one of the material cutter's tables on the eighth floor, probably caused by someone throwing a match or a cigarette butt into the bin. There were masses of highly flammable scrap material around the factory in bins, on tables and floors — estimates were as high as one ton at the time of the fire. Smoking was officially banned, but it went on fairly openly and the factory owners, who were in the premises daily, did little, or nothing, to stop it — one of many of their cavalier, profit-driven attitudes to workplace safety.

The fire spread with terrifying speed and ferocity, fuelled by the masses of flammable material in the factory. Within five or six minutes, it had engulfed all three floors. The internal fire hose system failed to operate. In each stairwell, on each floor, there was a fire hose with a valve. The water supply came from a tank on the roof but when the eighth-floor valve was



Figure 1 – The fire brigade hoses failing to reach the top floors at Triangle

opened, no water issued from it. To make matters worse, the city fire brigade's fire hoses only reached adequately up to six floors, despite the fact that half of New York workers laboured on seventh floors or above (Figure 1)¹². The factory was not equipped with a water sprinkler system even though these were readily available. In fact, a survey carried out some time before the fire found only one such system in one thousand establishments in New York.

The doors to some of the stairwells and exits were kept locked on the instruction of the owners to prevent theft of blouses. Because of this, many of the workers were unable to escape by these routes. Some of them used the fire escape ladder located on the outside of the building. This was so flimsy that it soon collapsed under the weight of the people using it (Figure 2). It was supposed to have been replaced by a third staircase (each floor had two) but the city authorities did not enforce this. Access to it was by shutters from each floor that opened outwards onto narrow balconies. Unless these shutters were carefully folded back and hooked to the exterior wall (hardly something that would be done in the panic that people were in) they continuously "flopped about" and impeded escape.

The workers on the tenth floor were not warned about the start of the fire on the eighth because the "telautograph" (a fairly useless predecessor of the fax machine) did not work. This was hardly surprising because nobody knew how to work the machine properly — they had not been shown how. The phone was not answered because the lady on the switchboard was doing two jobs and was busy typing bills. Messages to

the ninth floor had to go by telephone via the tenth floor switchboard but the message was not answered. So the ninth floor was not warned in time either. Timely warnings would certainly have reduced the death toll on these two floors, but the communication systems were inadequate.

At the end of the shift, only one worker at a time could go into the exit elevator. They had to pass through a narrow opening, showing the contents of their bags to the watchman so that he could check for theft. This narrow passage slowed down the means of escape so much that people were forced to try to use other means such as the fire escape, going up onto the roof and, horrifically, jumping from the windows in the vain hope that the Fire Brigade safety nets would break their fall. These nets, however, were too small and flimsy and 62 people died by falling to the ground eight, nine or ten floors below.

Some workers managed to escape onto the roof and were rescued by people in adjacent, taller, buildings lowering ladders down to them. These same people had expressed their concerns about conditions in the Triangle Factory before the fire. A professor of law had written to the city building authorities about the crowded and dangerous conditions in the Triangle Factory, which he could see from his lecture room. Nothing had been done about it.

Amazingly, when the factory owners were brought to trial for manslaughter, they were acquitted. Even the finding of the lock from the ninth floor door still in the "locked" position, as well as all the other damning evidence, failed to prevent the defence counsel from getting the owners released. They used the "time-honoured" process of raising doubts in the minds of the jurors, often by putting pressure on unsophisticated and frightened witnesses.

All this took place against the background of the institutionalised graft, favouritism and corruption that characterised the New York system of safety regulation, law enforcement, and many other matters, at the time. The police force, building and safety regulators, fire services and others, were all "in the pocket" of the ruling city authority – Tammany Hall. It was virtually impossible to get even the simplest of safety measures installed. Fire water sprinklers were just one of many such examples. Any attempt by workers to come together and protest about working conditions was ruthlessly crushed. The aftermath of the disaster at last brought about some significant improvements, though too late for the Triangle victims. In 1913, 25 bills that totally recast the labour laws of New York State, were pushed through. These included safety measures that ensured that almost every deficiency in the Asch Building had been addressed by two years after the fire. Throughout the state, alarm systems and automatic sprinklers became mandatory, doors had to be kept unlocked and safe access to escape routes maintained. Fire drills were made statutory — there had been absolutely no training in what to do in the event of fire in Triangle. Shorter working weeks became law and unions started to be recognised. The American Society of Safety Engineers was founded in October 1911 as a direct outcome of the tragedy.

The Tazreen Fashion Factory fire

In much more modern times, a very serious fire occurred, on 24 November 2012, in this factory, located in Dhaka, Bangladesh. It started presumably due to an electrical short



Figure 2 – The twisted remains of the fire escape and the outward opening doors at Triangle

circuit on the ground floor of a nine-storey building and trapped the workers on the floors above. There was some suggestion of arson, but this was not proven. Whether or not this was true, the key features again showed frightening similarities to the Triangle and Hamlet disasters. Narrow exits and insufficient staircases meant that many workers could not escape from the floors above ground level. Twelve people jumped to their deaths from windows above the ground floor. The three staircases from the upper floors all led to the outside via the inner ground floor. There were no external fire escapes. In all, at least 117 people perished in the fire.

Prior to the fire, there were several reports of unsafe conditions in the factory, but the management did little or nothing to address these. The fire safety certificate had expired in June 2012 — five months before the fire. Some of the exits from the factory were padlocked and workers were prevented from leaving the building. Even after the fire had started, some supervisors told workers to go back to work as "it was just a fire alarm failure."

Sweeping changes in regulations, and workplace safety standards, in the Bangladesh clothing manufacture industry resulted from the response to this disaster. Factory inspector training would be increased, means of escape (staircases and exits) would have to be modernised and be more numerous. Space between items of equipment would have to be sufficient to allow easy egress in emergencies.

The fire at Our Lady of the Angels School

On 01 December 1958 a major fire broke out in this school,

located in Chicago, Illinois. A total of 92 pupils and three nuns died either in, or as a result of the fire. Although it is not usual practice to highlight losses in educational establishments in LPB, a brief resumé is given of this awful accident because of its relevance to attitudes and controls in the built environment sector that persist to modern times, whatever the function of the building concerned. These are frequently the result of archaic institutional practices that nobody so far has seemed able to fundamentally change.

The fire started in a cardboard trash drum in a stairwell, initiated by means that were never conclusively established. Timber joists, wooden walls and floors and a tarred roof were factors that allowed the fire to spread extremely rapidly. There was some suggestion of a delay in Fire Brigade response time but, in the end, it was judged that they did all that could possibly have been expected of them to control the fire and minimise loss of life.

The key factor that makes this tragedy important in the context of institutional practices is that the school was allowed to continue in use without the benefit of fire safety measures that became law after it was built. The school was built in 1939, but when Chicago's municipal code on fire safety was re-enacted in 1949, there was no stipulation that perfectly feasible and practicable measures had to be installed retrospectively. This was due to the existence of a so-called "grandfather clause" that allowed existing facilities to carry on as they were — a practice that is often repeated in industry. Thus, the school had no water sprinklers, no fire doors and no smoke detector/alarms. The existence of any of these would

almost certainly have saved lives. After the tragedy, of course, all these and many other measures became required by law throughout the USA — but too late for the victims of this fire.

The conundrum of institutionalism

All these accidents have the common theme of perverse institutional attitudes that had a direct influence on the initiation of the accidents and the immediate responses to them. The conundrum — how to change these attitudes and replace them with those that have a positive and benign effect on safety standards and cultures — is a question that has provided much food for thought and action, in many organisations and minds, for many years, and will doubtless continue to do so for some time to come.

In her concise summary of her review team's report into the Grenfell Tower disaster⁸, and in the report itself⁹, Hackitt points out the many institutionalised shortcomings that were root causes of this terrible accident. Even more sadly, some of them echoed the faults that led to the previous cases described, going back to the early 20th century and continuing right through to modern times. This does beg the question "what have we learned from these tragic accidents and put into effect to prevent recurrences?" Not enough, it would seem.

Thus, her enquiry finds, *inter alia*:

- Many people who were part of the system surrounding Grenfell — industry, regulators and residents — knew that things were very wrong before the fire occurred.
- The system of control was unbelievably complex and rife with opportunities for potentially dangerous shortcuts.
- Roles were unclear, compliance weak and sanctions virtually non-existent.
- The concept of peer-reviewing proposals for change or modification, to ensure that safety would not be compromised — a key requirement of the chemical engineering and nuclear industries for decades — did not exist in the built environment sector.
- Buildings were often completed without a comprehensive record of what had been built.
- The focus concentrates heavily on minimising costs, to the detriment of safety.
- The fragmented nature of the regulatory system is dangerous from a safety viewpoint.
- Specifically, any system that can approve high rise buildings to be built with only one staircase (such as Grenfell) and assume that each separate dwelling is a fire-resistant compartment that will not be breached by an external fire, is quite clearly, deeply and tragically flawed.
- Most culpably of all, the flammable cladding material on the external walls should never have been used.

To deal with this wide-ranging and frightening catalogue of shortcomings, and to prevent recurrences of Grenfell-type tragedies, the Hackitt Inquiry recommends the introduction of a safety case approach to the construction and maintenance of high risk, high rise buildings. This new regime, mirroring what is already present in other industries such as the process industry, should be overseen by a competent regulator

who will hold a person responsible to account throughout a building's life cycle. This person, known as the "duty-holder", must be clearly identifiable at every stage. The safety case approach would provide gateways that could only be passed upon presentation of a satisfactory and safe design and these would extend right through until a safe design for occupancy has been presented and approved.

Whilst there is no doubt that such an approach is urgently needed, and would go far towards alleviating the dysfunctional existing approach existent in the building industry, it is respectfully suggested that it would not, on its own, provide a total solution. It needs to be backed up by a "sea change" in the attitudes of the organisations that control and manage the operation of projects such as Grenfell and the others herein described. The institutional cultures and attitudes to safety and loss prevention need to be overhauled and changed in a "root and branch" manner. This approach has been used with great benefit in the process industries for three decades or more. Many major organisations such as Exxon, the nuclear industry, ICI and the companies that stemmed from it, have achieved significant reductions in accident rates by the application of these techniques.

The process of safety culture change needs to be bought into at the most senior levels in an organisation then extended downwards to the most junior. A belief in the benefits of the process must be visibly demonstrated by such means as:

- not tolerating, and strongly condemning, unsafe behaviours and practices;
- establishing key safety behaviours and performance indicators and ensuring that they are followed;
- using processes that help trigger people to identify what consequences their actions might cause;
- asking themselves the question "what might happen next if I do this?"
- adopting inherently safer approaches or additional safeguards;
- praising safe behaviour;
- maintaining a realistic, well-balanced sense of vulnerability;
- instilling the belief that a good safety culture saves money and makes the organisation more successful — contrary to the popularly-held belief that safety slows things down and results in a reduction of profit;
- and others.

The effectiveness of this approach can be seen in markers including accident rate reduction. Thus, a nuclear industry factory achieved a reduction in RIDDOR¹³ lost time accident (LTA) rates from 1.4 to zero (per 100,000 person-hours) over a 12-year period, then maintained the rate at, or about, the improved level.¹¹ A food-producing company used the techniques to help bring about a reduction in LTA rate from 1.3 to 0.3 over five years.¹⁰ Of course, minimising LTAs will not on its own prevent major accidents. In fact, there is factual evidence that some major accidents have occurred when a company focussed too much on relatively minor accidents rather than mores serious ones. However, the widely accepted Heinrich/Bird Accident Triangle does show that, within a sound safety culture, there is a clear quantitative link starting

from near misses and going through increasing levels of severity to major accidents.

It has also been used to good effect in the prevention of commonly recurring accidents — a traditional problem of safety management. Reduction of accidents in confined spaces¹⁴, and those resulting from overfilling of vessels¹⁵, inadequate isolations¹⁶ and simple (but often with serious consequences) slips, trips and falls¹⁷ have all been achieved by application of culture change/behavioural safety techniques combined with engineered approaches and process safety management systems.

Application of these techniques to projects in the built environment industry would, it is proposed, strengthen, and increase the effectiveness of, the legislative-driven approach recommended by the Hackitt Inquiry.

Conclusion

What this article sets out to show is that deeply entrenched institutionalised attitudes and practices have been an important factor in the cause of several similar, major accidents over a period of about a century. The one most starkly present in most people's minds — the Grenfell Tower tragedy — serves as a chilling demonstration that little has changed in terms of these attitudes and their potential outcome. The far-reaching investigation of Dame Judith Hackitt and her team into Grenfell, points to the way in which legislation must be used to bring about a long-overdue change in this situation. This change, however, needs to be supported by changes in safety attitudes, culture and behaviour, by all concerned, in any industry, but specifically the built environment, for it to succeed.

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