Incorporating RM principles- Learning from Accidents

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On an average 5 major fires are reported in India every day where the loss is more than INR 5 million. While the reason for these large numbers of fires is not exactly known it is assumed that most of the fires are caused due electrical issues. However, these fires are not investigated scientifically to ascertain the root cause of the fire, why it spread, how did the Fire Protection systems performed. It is a matter of concern that this particular issue is not getting the requisite attention and corporates still believe that fire accidents are not preventable. This article links the de tariff regime being witnessed in India and the techniques employed by corporates to de-risk and employ Risk Management techniques

As it can be seen in the table below, insurance companies report huge losses due to fires.

Insurance Company	2004-05 (Rs. In Millions)	2005-06 (Rs. In Millions)
New India	3270	6010
Oriental	3520	2800
National	1441	2465
United India	1524	1807

Analysis of these accidents indicate that the major reasons for these fires is

a) Absence of Safety culture
b) Not addressing the safety requirements during design stage and incorporating the safety requirements at the planning stage
c) Absence of adequate Fire Protection systems
d) Poor emergency planning and response

It should be noted that the as the role of services sector in Economy has increased substantially(in fact it is more than 50%) but the corresponding increase in awareness has not been witnessed. For example one of the telecom companies in India suffered a major fire loss which was considered the highest fire loss in telecom industry in the world.

Similar way, fires were reported from big malls, retail outlets of major companies, banks, standalone warehouse etc. It was noticed that understanding of fire risks in these industries is low and very little care is taken in in-corporating the fire safety requirements at the project stage. At best at many installations only fire extinguishers can be observed even though goods worth crores of rupees is at stake

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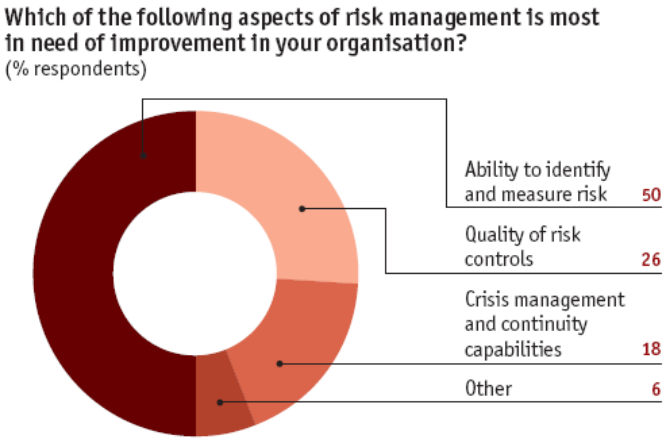
With change in technology like automation, globalization the risk profile of a company is fast changing. However, not many companies are adopting the proven risk management principles of identification, assessment, control and transfer into their operations and planning. Projects are getting started without taking into consideration the environment impacts, acquisitions are happening without following proper environment due diligence principles.

While due importance is given to designing and marketing of products, the general storage and handling practices, packing is neglected resulting in huge transporation losses. While the average losses across the world during transportation is less than 5% in India it averages more than 10%.

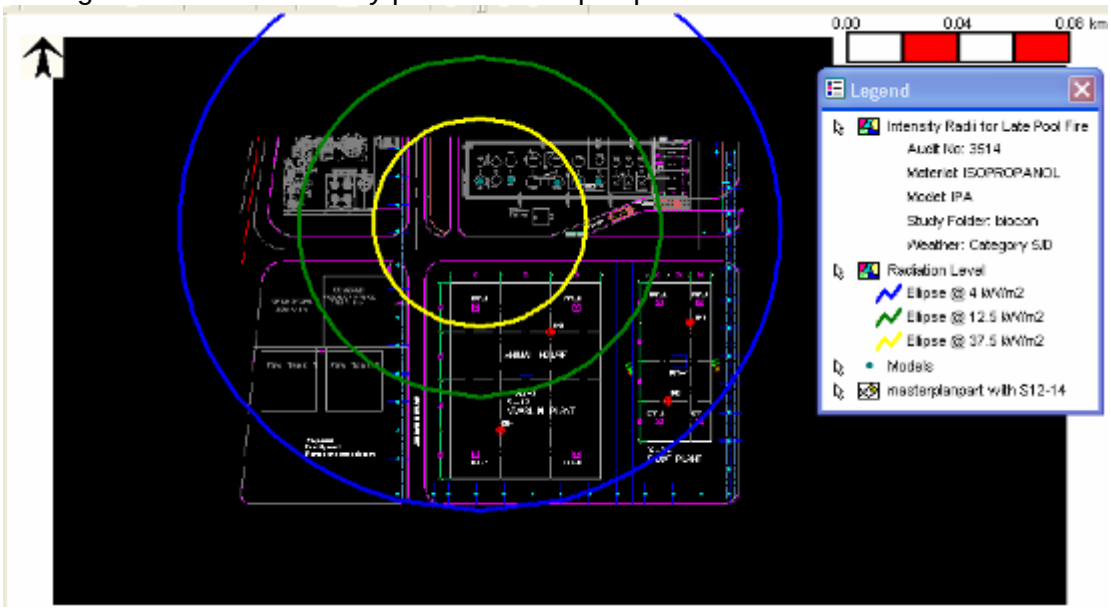
Now the question arises in everyone's mind why is that Indian corporates are failing to adopt risk management principles – what is considered so important outside India why is that it is not being followed. The answer to this is not straight forward. It is combination of lack of awareness, lax implementation of laws, absence of insurance drivers and absence of other deterrents. A survey by Economist indicates that 50% of the corporates feel that they lack the ability to identify and measure risk.



In addition to tangible losses, intangible losses such as reputation risks are gaining in importance. Contaminated food or toys containing obnoxious substances can have dramatic consequences for producers, as can business interruption, where a company might be forced to suspend production for weeks or even months, possibly losing customers to competitors as a result. Whilst the loss itself and running costs during the interruption can be insured, the loss of customers or market share cannot.

However, the awareness is not uniform across . Corporates which are exposed to global practices are observed to be adept in adopting new practices. Many are adopting what is called ALARP(As low as reasonably practicable) principle. This principle first popularized in UK in 1974. For a risk to be ALARP it must be possible to demonstrate that the cost involved in reducing the risk further would be grossly disproportionate to the benefit gained. How do successful corporates are addressing the Risk by adopting ALARP? The risk management exercise starts with addressing the risks at the drawing board stage itself. The following example illustrates the advantage of using advanced risk management techniques in siting the various facilities.

The biotechnology firm had a solvent tank farm which consisted of storing solvents like Hexane, Toulene, Benzene,IPA etc. Quantitative risk assessment was carried out to determine the damage distances due to catastrophic failure of IPA tank. When the damage curves were actually plotted on the plot plan it



Damage distances downwind (in meters) due to rupture of facility and ignition leading to pool fire:

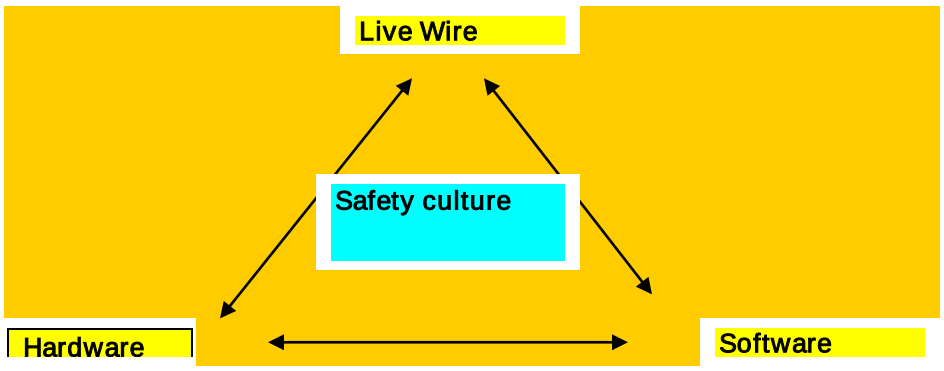
S No	Facility	37.5 kW/m2	12.5 kW/m2	4 kW/m2
		D 5 m/s		
1	Rupture of Isopropyl alcohol tank	51.7	77.1	117

was discovered that fire pump room was falling with in the damage distance. Following this study, the location of fire pump room was changed. If this exercise was not carried out the location of fire pump room would hv been located in the wrong location which could have to catastrophic losses.

In one more case involving a major refinery, fire water network analysis was carried out using latest software. To the surprise of everyone, it was discovered that existing fire water network can not meet the OISD requirements of fire water demand for two simultaneous fires. This particular refinery had 28 fire pumps and more than 50 kms of fire water network. While the normal routine tests does not tell you the latent design defects, use of sophisticated softwares to do simulation studies will help corporates to identify the problems at an early stage. This type of assurances help Insurance companies to determine the risk profile of the company.

Rapid advancement in science and technology led to development of very sophisticated plants which require almost nil intervention (e.g Gas turbines) for extended period of time. Today, technical measures for preventing and fighting fires are no longer seen as to sufficient to guarantee the safety of an industrial risk; and by same token routine survey by a risk surveyor is no longer adequate for assessing the quality of risk.

In more recent years, high risk industries like Petrochemical started focusing on human risk behaviour. Introduction of human risk factor into the risk management function has far reaching consequences. It increases the number of basic approaches from two to three, changing the simple dual relationship of technical and organizational to a triad. This leads to the concept of measuring safety culture. most famous being the Swiss Re's SMAPI(Safety Management Audit in Process Industry



Tools like PSM (Process Safety Management) Audits have become vogue world wide. (In PSM, the word process goes beyond the production process itself to include in the widest sense all processes directed at achieving a specified goal).

Learning from accidents: Many companies have now adopted the approach of investigating the near misses also. Root cause analysis is done for majority of accidents and lessons learned are incorporated in the plans
Apart from the above, Insurance companies are increasingly looking towards the preparedness of the corporates to face disruptions. Well laid out BCP plans supported with appropriate supporting structures are a necessity for a corporate to showcase that it is prepared for any eventuality. A typical BCP plan not only addresses the normal threats but prepares the organization for low frequency but high impact events.

Many managers have so far been insufficiently aware of the changed risk profile of their company because in most cases information is not available. As a result, they unwittingly expose themselves to higher risk in pursuit of overriding goals such as growth and increased profits.

An understanding of the need for holistic risk management is developing only gradually, especially in small and medium-sized companies, but in future, companies of any size in all sectors of activity will have to address the issue of holistic risk management, i.e. risks will not be considered separately, but as a whole. This paradigm change is supported by the following arguments:

- New types of risk and chains of cause and effect can no longer be properly managed using traditional separate assessment.

- Decision-makers in companies need a clear understanding of the overall risk situation and the effectiveness of any possible action they might take. In the context of risk management, they must be in a position to carefully consider and decide which risks to retain and which to transfer.

- Risk culture is changing. At many companies, an exclusively negative perception of risk is giving way to a desire to manage opportunities

- Cost of risk transfer has become dynamic- insurers are pricing the risk based on quantitative methods rather than perception or previous records. (e.g use of earth quake damage models, flood risk models to price the covers based on the location of the risk)

Indian corporates have a longway to go in adopting wholistic risk management approach in addressing their risks. De-tariffed market is expected to give the necessary impetus to systematic approach to managing risks and attention of top management. By adopting state of the art tools to investigate major fire accidents and incorporating the lessons learned while setting up new plants will go long way in reducing the fire accidents in India

Annexure 1

Facility: Buncefield, UK

Date: Dec 2005

Consequences: No fatalities but significant damage to surroundings.

Fatalities: None

Description of Accident: Overfilling (with unleaded petrol) of a tank led to fuel starting to overflow. The protection system which should have shut off the supply did not operate and continued pumping led to the fuel cascading down the side of the tank leading to the rapid formation of a rich fuel/air mixture that collected in the bund.

A large vapour cloud was formed which found an ignition source resulting in a violent explosion. This was followed by further explosions and a large fire that engulfed over 20 storage tanks.

Key Lessons Learnt: The investigation is ongoing and the key lessons will be included in this factsheet when the final report is available. The initial report published in July 2006 identified three areas for recommendations:

- Design and operation of storage sites
- Emergency response to incidents
- Advice to planning authorities

The recommendations on design and operation of fuel storage sites were published in March 2007. The report details 25 recommendations which are grouped under six headings:

- Systematic assessment of safety integrity level (SIL) requirements (Recommendation 1)
- Protecting against loss of primary containment using high integrity systems (Recommendations 2–10)
- Engineering against escalation of loss of primary containment (Recommendations 11–16)
- Engineering against loss of secondary and tertiary containment (Recommendations 17-18)
- Operating with high reliability organisations (Recommendations 19–22)
- Delivering high performance through culture and leadership (Recommendations 23–25)

Recommendations 1–16 emphasise the need to increase the

protection provided by primary containment systems i.e. to make sure that liquid does not escape from the vessels in which it is normally meant to be confined.

Recommendations 17-18 deal with improvements to secondary and tertiary containment.

Recommendations 19-22 deal with human and organisational factors.

Recommendations 23-25 deal with broader strategic objectives relating to sector leadership and culture.

BP Texas

Facility:	**BP Texas, USA**
Date:	Mar 2005
Consequences:	15 fatalities
Fatalities:	15 fatalities
Description of Accident:	The incident occurred during the start-up of an isomerisation (ISOM) unit when a raffinate splitter tower was overfilled and over-heated. When liquid subsequently filled the overhead line, the relief valves opened. This caused excessive liquid and vapour to flow to blowdown drum and vent at top of the stack. An explosion occurred which killed 15 people and injured many others. All of the fatalities occurred in or near office trailers located close to the blowdown drum. Houses were damaged as far away as three-quarters of a mile from the refinery.
Key Lessons Learnt:	There are several major reports on the BP Texas accident which provide key lessons on the accident. The lessons outlined below are taken from the Baker Panel Report. • A positive safety culture requires good process safety leadership. There should be a clear commitment to process safety by articulating a clear message on its importance and following through with related policies and actions. • An integrated and comprehensive process safety management system that systematically identifies, reduces and manages process safety risks should be established and implemented. • Personnel should have appropriate level of process safety knowledge and expertise.

- A positive, trusting and open process safety culture that involves all relevant stakeholders should be developed.
- There should be clearly defined expectations and accountability for process safety at all levels.
- Leading and lagging indicators should be implemented, maintained and periodically updated for more effective monitoring of the process safety performance.

An effective system to audit process safety performance should be established and implemented.

Report: BP Texas.pdf

Links:

Baker, J. et al., 'The B.P U.S. Refineries Independent Safety Review Panel', 2007

Mogford, John et al., 'Fatal Accident Investigation Report, Isomerization Unit Explosion Final Report, Texas City, Texas, USA, 2005

US Chemical Safety and Hazard Investigation Board, 'BP Texas City Refinery Explosion and Fire – Investigation Report', 2007