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## **FIRE-FIGHTING AND SAFETY AS AN INTEGRAL PART OF FACILITIES MANAGEMENT: PRACTICES – IDEAL/STANDARDISED VS. ACTUAL**

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### **ABSTRACT**

*Facilities management is the only field which is constantly in interaction of the occupants after the completion of construction of any building. It deals with the operation and management of Fire Fighting and Safety, HVAC, Elevators, Parking, Plumbing, Water Supply, Waste disposal, Electricity, etc. This study basically focuses on the Fire Fighting and Safety aspect of Facilities Management. The research is done for Residential and Commercial high rise buildings of heights from 15 to 40 metres as case studies. The study explores various aspects of the system of fire-fighting and safety in the case studies and checks whether it follows the codes and regulations stated by the Government of India in the form of Indian Standards, National Building Code, etc. The study takes into consideration potential hazards, detection systems, warning systems and fighting systems, management of all these systems, its operation and maintenance, and the evacuation procedures. Although majority of the codes are followed in the design of buildings, they fail to comply with the codes in the matter of provision of proper detection and warning systems, training and the evacuation plans.*

**Key Words:** Fire-Fighting, Safety, Detection, Warning, Management, Evacuation, Extinguishers, Alarms, NBC, IS, Escape Routes, Signages, Ramps, Alternative Exits, Maintenance, Inspection.

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### **1. Introduction**

With growing competition in the real estate market, plenty of necessary facilities are being compromised with a view of monetary gain; Fire Fighting and safety plays an important role in the functionality of any project. Fire-fighting and safety must be viewed as a necessity instead of a mere facility. This research would enlighten the

practices as observed in buildings and the ideal practices as mentioned in the standards.

Efficient and well equipped fire services in buildings are essential to respond to fire hazards. In order to organize a conscious, planned and a determined effort in all the states to improve fire-fighting capabilities in the country, prevent unacceptable deaths and

huge loss of property, definite guidelines are needed in terms of setting up of fire stations, their spread at different levels, their scaling, type of equipment and training of manpower.

## 2. Background

Major fire hazards are observed in high rise buildings in metropolitan cities. These buildings lack adequate in-built fire protection systems and the existing equipment are not effective to fight fires from outside at high levels. The buildings, therefore, can be death traps. There are many cities in the country where hundreds of high-rise buildings have come up but the fire service there are as primitive as fire itself.

## 3. Review

Good preventative and response practices must be part of that mix as well, starting with the commitment of management and spreading throughout the workforce. These practices include the following:

Fire extinguishers (high-pressure water or dry powder) and fire alarm pull stations in highly visible locations; Regular inspections of alarms and sprinkler systems; Annual fire tests and regular drills; Isolating computers and electrical equipment from general storage areas; Regular roof maintenance and repair; Safety inspections of trucks and aerial lifts before use; Secured facilities and high-risk areas, including monitoring and after-hours inspection, ensuring no access by unauthorized or untrained persons at any time; Minimal use of combustible furniture.

The General fire-fighting systems provided in the common commercial buildings and high rise are Water based Fire Fighting Systems (WFS), which usually is activated when the fire has ignited, this may lead to minor to major damage to the premises.

Preventive maintenance systems may help in the prevention of the ignition of fire and thus saving the building from any possible damage.

Approval and certification practices also play an integral role in the safety of a building. Poor certification and approval may lead to disastrous circumstances.

## 4. Need of the study

The developers thus tend to cut down their costs by neglecting the necessary amenities like fire-fighting and safety which plays an important role in the functionality of any project and any ignorance in it part could result in a major disaster causing loss of life and money.

This research would enlighten the practices as observed in buildings and the ideal practices as mentioned in the standards.

A huge fire had recently broken out on the 63 floor high rise hotel in Dubai on 31<sup>st</sup> December, 2015 which had spread from 23<sup>rd</sup> floor to 40<sup>th</sup> floor. All were evacuated with only 16 injured. Would it be possible if similar situation was created in Ahmedabad even if it was a 14 floor building?

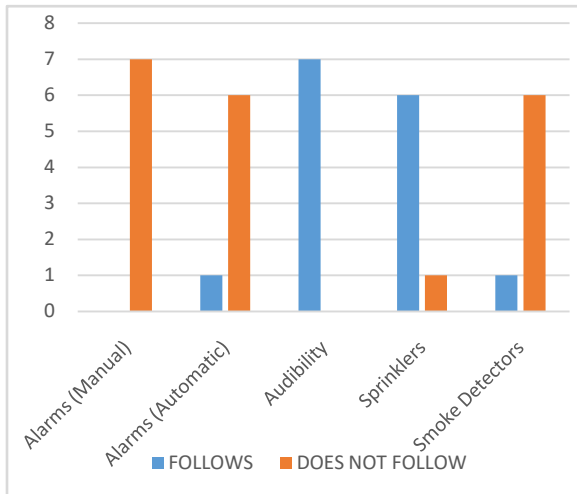
The response to this was clear when a fire broke in a building in the Gurukul area of Ahmedabad on 9<sup>th</sup> March 2016 which claimed four precious lives. Of these 4 deaths, two were caused due to asphyxiation and the other two due to severe burns.

## 5. Data Collection and Analysis

Data for the research has been collected taking seven high-rise buildings of 15-40 metres in height and occupancy from 100 to 400 people.

The major flaws were found in the provision of the detection and warning systems. Majority of the buildings failed to comply

with the regulations stated in the codes. The following graph shows the Similarity Variance analysis of the data obtained from the surveys.

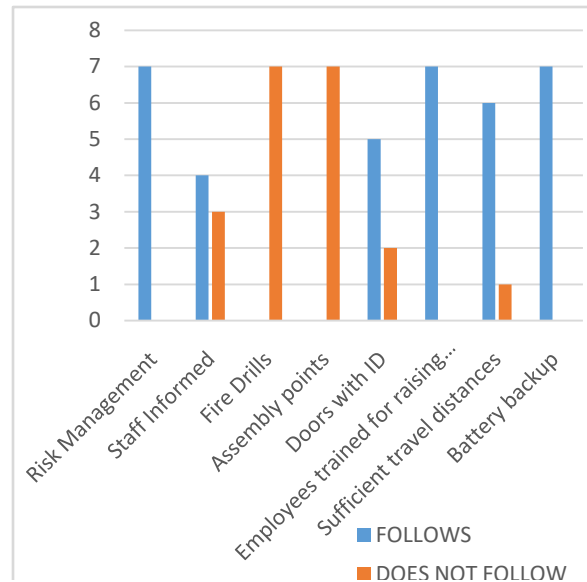


**Figure 1 SV Analysis: Detection and Warning**

As all high-rise buildings must have an automatically operated alarm system as per Annex C-3.1, Part IV, IS SP 7: 2005, majority of the buildings fail to follow the code although they provide manually operated alarm systems.

Management system of the buildings also showed some serious defects.

None of the buildings organized fire drills which is to be done every 3 months as stated in the NBC. No assembly points were provided in any of the buildings. The staff also remained ignorant of the available fire safety equipments. The following graph shows the Similarity variance of the Management systems of the buildings.



**Figure 2 SV Analysis: Management**

Evacuation came out to be the most ignored area in the fire-fighting and safety of the buildings taken as case studies. No (illuminated or non-illuminated) signage for exits provided in any of the buildings, no specifically defined escape routes mentioned, no emergency lighting provided in most of the buildings, almost all the buildings with basement parking had 1 ramp instead of 2 as mentioned in the code. Alternative exits on a different side of the main entrance is not provided in any of the buildings. These things may seem petty but they play a major role in the safety of the occupants in the time of emergencies. The similarity variance graph of the Evacuation system in the buildings is as follows.

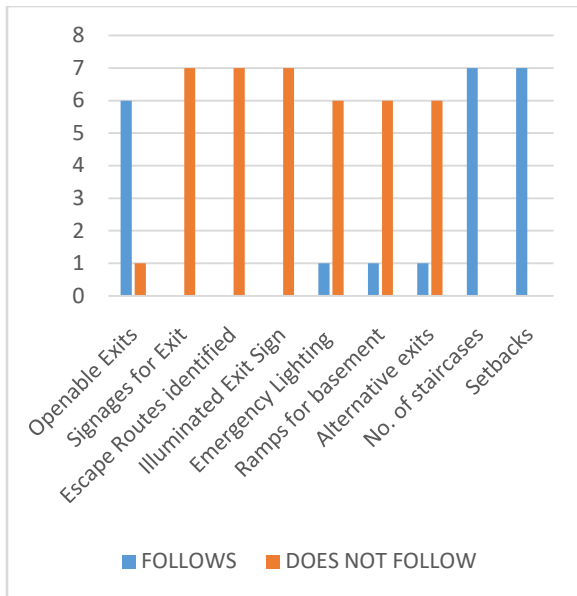


Figure 3 SV Analysis: Evacuation

## 6. Conclusions

From this research, one may get an idea to the extent of improvisation that the city needs to secure the citizens from hazards caused due to fire.

It can be reasonably stated from this research that the buildings fail to follow the NBC in the provision of the Detection systems and adequate evacuation plans. These systems must be included in the design process of the buildings and installed during the construction phase. Due to ignorance and the negligence of the builders, the occupants are victimized in times of calamities.

Alternative exits have been ignored and dedicated water tanks for fire hazards are not provided. Inspection of equipments needs to be regulated and managed by efficient people.

The Government must make sure that all the new constructions follow the Standards and comply by the rules and the older constructed buildings are equipped with proper systems to protect the occupants in times of emergencies.

## 7. Proposals

### I. Heat/Smoke Detecting Auto-Illuminated Escape Routes

This equipment may fit inside the smoke detector for the alarms and is also connected to a string of lights which lead to the exit. This could be accomplished with just a series of small LED lights and an electrician who can connect the sensor to power the lights when smoke is detected.

### II. Heat/Smoke Detecting Automatic Ventilators

This is a similar instrument to the Heat Detecting Illuminated Escape Routes with the difference that this would open a ventilator for the smoke to move out and checking occupants from asphyxiation.

### III. One Way Hydraulic Elevator

This type of elevator can be used for evacuation during emergencies which lead to electricity cut off and would prove to be a boon for elderly people who cannot climb stairs. This elevator would require electricity to move upwards but can move downwards due to self-weight and the weight of the occupants. A hydraulic regulator can be provided to manoeuvre or stop at levels to carry occupants. Such an elevator should be kept on the top floor of the building and thus be used to carry occupants to the ground level.

### IV. Fire Safety Staircase

These type of staircases are mandatory in many countries around the world but the Indian Codes has not made this compulsory. This could prove to be a very effective evacuation method during times of emergencies.

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