

# ASSESSMENT OF EMERGENCY MANAGEMENT FOR HIGH-RISE BUILDING PROJECTS IN PUNE

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**Abstract-** *The high-rise building projects industry has one all told the foremost necessary employers in India once agriculture and there is quick development in industry. Safety of human life is most important than the other issue. The importance of a decent workplace safety and health program cannot be overemphasized. Although high-rise buildings are given the foremost delicate emergency management choices, assurance of safety to fashioning occupants is questionable and management doubtful. Emergency as fireside outbreaks occur as a results of “human factors”, like carelessness, negligence or simply an absence of fireside safety awareness. This study presents the results of the investigation on emergency management in high-rise buildings. The objectives of the study are to identify the aspects of emergency management that influences fireside safety of high-rise building users; to establish the foremost crucial of these aspects; and to identify ways in which to boost fireside safety of high-rise building users. The methodology for conducting the study involved literature review, data assortment and analysis of results using the average Index technique. The method of data assortment involved obtaining primary data from the respondents by conducting form surveys at the chosen building case studies. It’s hoped that this study will provide some useful insight on the very important aspects of fireside safety management then, facilitate guide high-rise building users to safeguard each their life and property.*

**Keywords:** *Emergency management, High-rise buildings, Likert’s scale, Fire safety management.*

## I. INTRODUCTION

Emergencies and disasters will strike anyplace and at any time geographical point bringing injuries and sickness with them. Employers and associated staff are also needed to handle the emergency once it's least expected and correct designing before an emergency is important to reply effectively. A working place emergency could be a state of affairs that threatens employees, customers, disrupts or shuts down operations; or causes physical or environmental harm. Emergencies is also natural or artificial, and will embody hurricanes, earthquakes, floods, wildfires, winter weather, chemical spills or releases, malady outbreaks, releases of biological agents, explosions involving nuclear or radiological sources, and many other effects. Overall, this study is focused on the features of Emergency Management which influences fire safety of high-rise building users. Also, this study is additionally meant to spot strategies to enhance fireplace safety of high-rise building users. Basically, we are studying the background, drawback statement, aims and objectives, and scope of the study in this unit. The research methodology involved in conducting this study is also briefly explained. Lastly, a summary of all the chapters in this study are presented.

## II. PROBLEM STATEMENT

India has most force to utilize as facultative to the machine work to push employment. More than three crore folks are operating in construction industry of India. In India this is often among the foremost necessary problems. Few years before a thousand employees got scraped and more than 300 employees died at construction site as per international labor organization (ILO). According to National Safety Council (NSC), until day several construction firms don't have safety and emergency department. The responsibility is simply given to people who don't possess correct knowledge and skill in this field. The security record of industry is usually poor. Typically although there are safety and emergency provision created however implementation of those provisions don't seem to be found which might stop accidents. Government should offer not solely the correct tips and effective implementation of laws however conjointly ought to actively participate in it by the medium of emergency audit and safety.

## III. AIM & OBJECTIVES

The aim of this study is to investigate the pertinent aspects of Emergency and Fire Safety Management in high-rise buildings projects or construction sites and to identify methods to improve safety of high-rise building users. To achieve this aim, following objectives have been delineated as follows:

1. To know the attributes of emergency management that influences the safety of high-rise building users;
2. To study, determine and collect data required for Emergency Management Plan in the high-rise building project
3. Based on a questionnaire survey and in-depth interviews with a variety of industry stakeholders it proposes ways in which the construction sector can become more involved.
4. To identify methods to improve emergency and fire safety of high-rise building users.

## IV. SCOPE OF THE STUDY

The scope of this study has got to be narrowed down or targeted to alter the method of knowledge gathering so as to conduct the associate alysis among an acceptable time-frame. The scope of the study is restricted to:

1. Only high-rise buildings;

2. Two buildings case studies only;

## V. RESEARCH METHODOLOGY

The research will be conducted in several stages to achieve all of the objectives of this study.

1. The first stage would involve to conduct the literature review to seek out additional data concerning fire hazards and safety,
2. The second stage would involve conducting the field data collection by interviews with the help of questionnaire survey form and then analysis of the data obtained from the case study chosen.
3. The third stage of research would be to give conclusions and recommendations for future.

## VI. FIRE LIFE SAFETY MANAGEMENT IN HIGH-RISE BUILDINGS

In the world of high-rise buildings construction, security and life safety systems and equipments became a very important component that has to be taken into thought. However, achieving the suitable level of protection isn't potential with simply implementing one easy procedure. Rather, it's the synergistic result of all building systems and options operating along harmoniously that make sure the safety within the building. Therefore, it's essential that the high-rise security and hearth life safety systems be planned, managed and dead. Hence, the human interface has become the complementary issue that supplements these refined systems. In general, high-rise buildings should have an efficient hearth life safety management set up that has coaching and education for tenants and employees so as to cut back the probabilities of fireplace outbreaks from occurring.

## VII. BUILDING CASE STUDIES DATA COLLECTION

As antecedently outlined in the scope of the study, this study is targeted around two high-rise building case studies from Pune, Maharashtra. Following are the main points of case studies being taken into thought.

For the aim of this study, solely primary information is collected and utilized in the analysis to create conclusions. This primary information was collected by using the questionnaire survey forms that were distributed to the targeted respondents. In total, 17 questionnaire responses were obtained throughout field information assortment at the two high-rise building case studies. The sector information assortment was conducted throughout the lunch hour to accommodate the users who might not be free throughout operating times.

The targeted participants of the questionnaire survey comprised primarily of individuals who use high-rise buildings in their daily lives. This cluster of individuals was chosen since they're possibly to possess substantial expertise and background within the material and to form judgments and opinions that are relevant towards achieving the objectives of the study. As mentioned antecedently, the info assortment was supported an 8-page pre-tested questionnaire survey kind. The form was designed during an easy multiple-choice format with none open-ended queries. This was finished the intention of reducing respondent effort on the respondent's half, and conjointly to assist the respondents in creating selections while not confusing them.

High Rise Building Project	Name of Organization
A	Yogesh Enterprises (Builders, Developer & Promoters), Pune
B	Creative Turnkey Projects Pvt. Ltd., Pune

Taking all aspects into thought, a semi-structured approach with principally multiple-choice queries was chosen. A sample of the form employed in this study is shown in Appendix A. Responses for the multiple-choice queries are supported a Likert's Scale of 5 ordinal measures of agreement towards every statement (from one to 5) as shown below.

Disagree	Uncertain	Partially Agree	Agree	Strongly Agree
1	2	3	4	5

## VIII. QUESTIONNAIRE MEASURE

This questionnaire is measured based on a Likert's Scale of five ordinal measures from one (1) to five (5) according to the level of agreement as stated in Figure 1. The data generated from the questionnaire survey is analyzed using frequency analysis. The measurement tools in the survey provide quantitative indication of qualitative judgments.

The rating scale used for the questionnaire is;

1	2	3	4	5
Disagree	Uncertain	Partially Agree	Agree	Strongly Agree

The average index formula is given as:

$$(*) \text{ Average Index} = \frac{\sum (\mu * n)}{N} \text{ ----- (1)}$$

Where,

$\mu$  is the weightage given to each factor by the respondents;

$n$  is the frequency of the respondents;

$N$  is the total number of respondents.

With the rating scale given as below,

Rating Scale	Likert's Scale Factors	Average Index Between
1	Disagree	(1.00 ≤ Average Index < 1.50)
2	Uncertain	(1.50 ≤ Average Index < 2.50)
3	Partially Agree	(2.50 ≤ Average Index < 3.50)
4	Agree	(3.50 ≤ Average Index < 4.50)
5	Strongly Agree	(4.50 ≤ Average Index < 5.00)

## IX. RESULTS OF QUESTIONNAIRE SURVEY

### PART-1

The objective of this section is to identify the attributes regarding the Emergency Management that would carry out on the high-rise building construction site; Table 1 shows the results obtained from the field data collection:

**Table 1: The Aspects of Emergency Management**

Sr. No.	Elements	Frequency Analysis					Average Index	Category of Rating Scale
		1	2	3	4	5		
		No. of Respondents						
1	Carrying out emergency management at site	0	1	3	3	10	4.30	4
2	Satisfaction with current emergency/ safety management process	2	0	0	5	10	4.24	4
3	Using personal precaution equipments	0	4	3	2	8	3.83	4
4	Using any model for emergency management	4	3	3	4	3	2.94	3
5	Emergency management details discussed within the organization	2	0	0	3	12	4.35	4
6	Maintaining daily diary of principle activity	2	3	1	4	7	3.64	4
7	Carrying out inspection of work sites	0	0	5	5	7	4.12	4
8	Special department available for safety and emergency management	0	0	3	3	11	4.48	4
9	Organizing any emergency training process	0	3	5	5	4	3.58	4

### PART-2

This section attempts to identify the aspects of Fire Safety Management that would influence the fire safety of high-rise building users. Table 2 shows the results obtained from the field data collection:

**Table 2: The Critical Aspects of Fire Safety Management that Influences Fire Safety of High-Rise Building Users**

Sr. No.	Elements	Frequency Analysis					Average Index	Category of Rating Scale
		1	2	3	4	5		
		No. of Respondents						
1	Education and training of high-rise building users in fire life safety;	1	3	4	2	7	3.64	4
2	Conducting inspection of electrical installations;	1	1	2	2	11	4.23	4
3	Taking renovation work precautions and inspections;	4	1	2	5	5	3.35	3
4	Implementing pest control program;	6	2	5	3	1	2.47	2
5	Implementing good housekeeping practices;	3	1	3	3	7	3.58	4
6	Provide clear signage indicating exit routes and location of fire safety equipment;	0	0	0	5	12	4.70	4
7	Conducting inspection, operation and maintenance of fire safety equipment;	0	0	4	3	10	4.35	4
8	Implementing fire and evacuation drill procedures;	0	0	2	3	12	4.58	4

### PART-3

This section attempts to identify the methods to improve fire safety of high-rise building users. Table 3 shows the results obtained from the field data collection:

**Table 3: The Methods to Improve Fire Safety of High-Rise Building Users**

Sr. No.	Elements	Frequency Analysis					Average Index	Category of Rating Scale
		1	2	3	4	5		
		No. of Respondents						
1	Conduct more educational and training programs for high-rise building users to increase awareness and ability to react in case of emergency;	0	0	0	4	13	4.76	5
2	Implement Floor Warden System in high-rise buildings;	6	3	3	2	3	2.58	3

3	Assign specific personnel as Building Emergency Response Staff who are specifically trained for emergency situations;	0	3	4	3	7	3.82	4
4	Ensure that flammable materials are stored in a safe area;	0	1	0	8	8	4.35	4
5	Distribute pamphlets or leaflets containing emergency procedures and evacuation plans to high-rise building users;	0	4	4	2	7	3.70	4
6	Install high-tech fire safety equipment in high-rise buildings;	2	2	3	6	4	3.47	3
7	Conduct fire and evacuation drills on a regular basis;	0	0	3	4	10	4.41	4

## X. FINDINGS AND DISCUSSION

In this section, the findings of the study are discussed and inferences are made based on the results obtained. The aim of this section is to provide a more descriptive form of the tabulated data. The discussion will be based on the Average Index as the yardstick for comparing each statement. The value of the Average Index ranges from 1.00 to 5.00, with 1.00 being the lowest degree of agreement for the statement and 5.00 being the highest degree of agreement.

The discussion is divided into three parts. The first part touches on the aspects of emergency management. The second part discusses the critical aspects of fire safety management that influences fire safety of high-rise building users. Finally, the discussion focuses on the methods that can be undertaken to improve fire safety of high-rise building users.

**Table 4: The Aspects of Emergency Management (Descending Order)**

Sr. No.	Elements	Average Index	Category of Rating Scale
1	Special department available for safety and emergency management	4.48	4
2	Emergency management details discussed within the organization	4.35	4
3	Carrying out emergency management at site	4.30	4
4	Satisfaction with current emergency/ safety management process	4.24	4
5	Carrying out inspection of work sites	4.12	4
6	Using personal precaution equipments	3.83	4
7	Maintaining daily diary of principle activity	3.64	4
8	Organizing any emergency training process	3.58	4
9	Using any model for emergency management	2.94	3

As can be observed, the respondents agreed that all of the aspects listed above are crucial towards Emergency Management in high-rise buildings, since the average index of most of the aspects are between the ranges of 3.50 to 5.00. Thus, the aspects emergency management of high-rise building users has been successfully identified.

Based on the Average Index, the most relevant element towards the aspects of emergency management agreed by the respondents is that there should be special department available for safety and emergency management at the high-rise building project sites. Also emergency management details must be discussed within the organization.

The next important element agreed by the respondents is to carry out emergency management at site. Emergency management is the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies (preparedness, response, and recovery). The aim is to reduce the harmful effects of all hazards, including disasters. It should not be equated to "disaster management". Also most of the respondents felt that using any model for emergency management at site is not so practical. Thus the result obtained from the category of rating scale is only 3.

**Table 5: The Critical Aspects of Fire Safety Management that Influences Fire Safety of High-Rise Building Users (Descending Order)**

Sr. No.	Elements	Average Index	Category of Rating Scale
1	Provide clear signage indicating exit routes and location of fire safety equipment;	4.70	4
2	Implementing fire and evacuation drill procedures;	4.58	4
3	Conducting inspection, operation and maintenance of fire safety equipment;	4.35	4
4	Conducting inspection of electrical installations;	4.23	4
5	Education and training of high-rise building users in fire life safety;	3.64	4
6	Implementing good housekeeping practices;	3.58	4

Sr. No.	Elements	Average Index	Category of Rating Scale
1	Provide clear signage indicating exit routes and location of fire safety equipment;	4.70	4
2	Implementing fire and evacuation drill procedures;	4.58	4
3	Conducting inspection, operation and maintenance of fire safety equipment;	4.35	4
4	Conducting inspection of electrical installations;	4.23	4
5	Education and training of high-rise building users in fire life safety;	3.64	4
7	Taking renovation work precautions and inspections;	3.35	3
8	Implementing pest control program;	2.47	2

Based on the Average Index, the most relevant element towards the critical aspects of fire safety management that influences fire safety of high-rise building users is to provide clear signage indicating exit routes and location of fire safety equipment. An exit route is a continuous and unobstructed path of exit travel from any point within a workplace to a place of safety. All and any exit within a building should be considered a potential exit to safety. The next elements are having 4 as category of rating scale are Implementing fire and evacuation drill procedures; Conducting inspection, operation and maintenance of fire safety equipment; Conducting inspection of electrical installations; Education and training of high-rise building users in fire life safety; Implementing good housekeeping practices; respectively.

Lastly most of the respondents felt that there is uncertain need take renovation work precautions and inspections; implementing pest control program in buildings. But it is one of the trickiest environmental challenges for housing managers is pest management - finding the best way to control unwanted invaders while minimizing the use of potentially toxic pesticides. Pests such as cockroaches, mice, rats and bed bugs can be particularly troublesome in high-rise buildings.

**Table 6: The Methods to Improve Fire Safety of High-Rise Building Users (Descending Order)**

Sr. No.	Elements	Average Index	Category of Rating Scale
1	Conduct more educational and training programs for high-rise building users to increase awareness and ability to react in case of emergency;	4.76	5
2	Conduct fire and evacuation drills on a regular basis;	4.41	4
3	Ensure that flammable materials are stored in a safe area;	4.35	4
4	Assign specific personnel as Building Emergency Response Staff who are specifically trained for emergency situations;	3.82	4
5	Distribute pamphlets or leaflets containing emergency procedures and evacuation plans to high-rise building users;	3.70	4
6	Install high-tech fire safety equipment in high-rise buildings;	3.47	3
7	Implement Floor Warden System in high-rise buildings;	2.58	3

As can be observed, the respondents agreed that all of the methods listed above are crucial towards improving fire safety of high-rise building users.

Based on the Average Index, the most relevant method towards improving fire safety is to conduct more educational and training programs for high-rise building users to increase awareness and ability to react in case of emergency. This is true, since as previously mentioned; conducting these training programs will help prepare users to face a real fire situation in the event it occurs. It will also help to enhance the awareness of the users towards fire safety and their ability to react in the event of any emergency.

The second most relevant method agreed by the respondents is that Conduct fire and evacuation drills on a regular basis; and then ensures that flammable materials are stored in a safe area. Flammable materials that are commonly found in most buildings are solvents and fuels used for cleaning and maintenance purposes. These materials, if not stored safely, can pose a serious fire threat in any building. Hence, it is essential to store these materials only in specific storage areas. These areas should be fireproof and have firefighting equipment readily available nearby in case of any emergency.

The next is to assign specific personnel as Building Emergency Response Staff whom are specifically trained for emergency situations. Lastly, most of the respondents felt that it would not be practical to implement Floor Warden System in our high-rise buildings. In this system, a specific person is employed as a warden on every floor of the building to ensure fire safety in that floor. This system is practiced widely in the United States and also in European countries. Most of the respondents felt that this system is not practical because it would involve a very high cost, since the building management would have to employ many people. This cost would ultimately be passed down to the end-users in the form of higher maintenance fees. Most people are not willing to pay this higher fee, thus rendering this system impractical.

## XI. CONCLUSION

In order to complete the data analysis, quantitative judgments were employed. Statistics were used to analyze the background of the respondents and a Likert's Scale of five ordinal measures was used to identify the aspects of emergency Safety Management that influences fire safety of high-rise building users, the most critical of these aspects and the methods to improve fire safety of high-rise building users. The inferences were then made based on the results of the analysis. From the results, it is observed that Special department available for safety and emergency management is the aspect agreed by most of the respondents. The critical aspects of fire safety management that influences fire safety of high-rise building users provide clear signage indicating exit routes and location of fire safety equipment;

Lastly, the best methods to improve fire safety in high-rise buildings are to conduct more educational and training programs for high-rise building users to increase awareness and ability to react in case of emergency; to ensure that flammable materials are stored in a safe place; to conduct more educational and training programs for high-rise building users in fire safety; and to ensure there are clear signage to indicate exit routes and location of fire-fighting equipment in high-rise buildings.

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