

## **ANALYZING CONSTRUCTION SITE ACCIDENT IN SURAT**

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*Abstract: This Research presents a study that seeks an understanding of the causes of accidents in the construction industry and focuses on the role of management, human and behavioral and the project's nature in construction accidents. The thesis presents an analysis of accidents along with accident causation and injuries based on accident reports extracted from government agencies. The thesis then analyzes and ranks the causes of accidents in construction projects in Surat and the result with the individuals involved in construction project. A questionnaire is divided into five parts; from Section A: introduction to project Section B: Respondent details Section C: sample for filling questionnaire Section D: main question Section E: suggestion the causes are categorized into four groups, management-related factors; construction site and environmental & social factors and worker attribute related factors. The factors will be measured and ranked under each group by the 'Relative Importance Index' technique & 'Important index' technique. From the ranking give the top most causes construction site accident. Then this top most related risks are identified. To know the frequencies of occurrence of risk SPSS analysis is used. Recommendations included in the questionnaire to suggest a better application of policy and management actions and procedures to improve the safety at construction sites and projects will be used to generate a list of mitigating factors to be adopted for avoiding the accidents on construction site and related risk.*

**Keywords:** RII (relative important index), IMPI (important index), SPSS Analysis

### **I. INTRODUCTION OF CONSTRUCTION SITE ACCIDENT**

In India, construction industry holds the second position next to agriculture industry. The annual turnover of the construction industry in India is about 4000 Billion Rupees, which is more than 6% of the National GDP employing a large work force the number of fatalities occurring from construction work in the industry is quite disturbing and fall of person from height and through openings are the major causes for serious accidents. But the accidents occurring in India is very high compared to the foreign countries.

The prevention of construction accidents usually entails predicting future accidents and their nature under given circumstances. The making of such predictions is based on knowledge about past accidents. The major causes of accidents in the construction industry are related to the unique nature of the industry, human behaviour, difficult work-site conditions, and poor safety management which result in unsafe work methods and procedures.

Due to the fact that accident rates in construction are high when compared to other industries, the construction and projects managers need to be fully prepared to deal with accidents when they occur, undertaking proper investigations and reporting procedures afterwards. Accident statistics represent not only terrible human tragedies but also substantial economic costs. This is because accidents cause damage to plant equipment and the loss of productive work time until the normal site working rhythm and morale are restored. Accidents can also cause work disruption and reduce the work rate.

The major causes of accidents are related to the unique nature of the industry, human behaviour, difficult work site conditions, and poor safety management, which result in unsafe work methods, equipment and procedures. Emphasis in both developing and developed countries needs to be placed on training and the utilization of comprehensive safety programs.

## II. RESEARCH METHODOLOGY

To understand and identify the causes leading construction site accident, a questionnaire- type survey was conducted. The objectives defined in the preceding section were achieved through the accomplishment of the following tasks: The preliminary data for this research was collected through a literature review and the use of a questionnaire survey targeted at some contractors, clients and consultants. As the outcome, total 38 factors that affect construction site accident may be encountered in a construction project were identified. The factors for construction accident are then classified into four broad categories (management, construction site condition, environment and social factor & worker attribute) depending on their nature and mode of occurrence. The groups of factors affecting construction accident are showed nine following charts. List of 38 construction site accident factors in construction work are given. Figure.1 gives classification of factors affecting construction site accident in four major groups

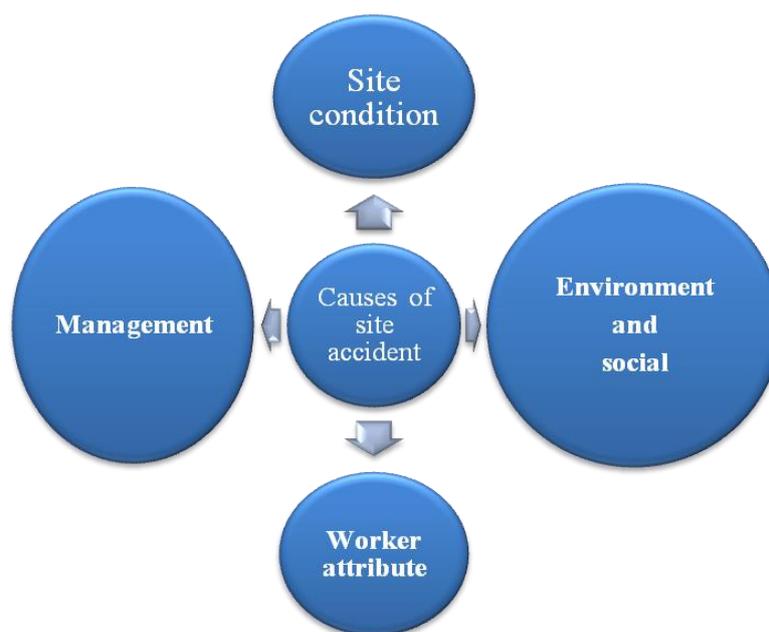


Chart 1: Causes of construction site accident into 4 categories

### III. DATA ANALYSIS

#### 1. RII (RELATIVE IMPORTANT INDEX)

The Relative Importance Index (RII) will be used to rank (R) the different factors that affect contractor performance. These rankings make it possible to cross-compare the relative importance of the factors as perceived by the three groups of respondents (i.e. architect/engineer, contractors, and developer/owner). Each individual factor RII perceived by all respondents will be used to assess the general and overall rankings in order to give an overall picture of the factor of contractor performance in Indian construction industry. This RII technique is used by many researchers like, Desai Megha et al., HanyAbdElshakour et al. (March 2012) to rank the various performances

$$RII = \frac{\sum w}{A * N}$$

Where,

W = Weighting given to each factor by the respondents (ranging from 1 to 4),

A = Highest weight (i.e. 4 in this case), N = Total Number of respondent.

#### 2. IMPI (IMPORTANT INDEX):

In this method of analyzing data, for each cause/factor two questions were asked to find out Frequency Index and Severity Index and on basis of this Importance index is calculated for ranking to factors. These two questions were what is the frequency of occurrence for this factor? And what is the degree of severity of this factor on best. Both frequency of occurrence and severity were categorized on a four point scale. Frequency of occurrence is categorized as follows: always, often, sometimes and rarely (on 4 to 1 point scale). Similarly, degree of severity was categorized as follows: extreme, great, moderate and little (on 4 to 1 point scale). Importance Index Method: The importance index is calculated as a function of both frequency and severity indices, as follows:

$$I.I. = [(F.I.) \times (S.I)] \div 100$$

Where,

F.I. = Frequency Index: It is used to rank causes of delay, based on frequency of occurrence as identified by the participants.

$$F.I. = [\sum a (n \div N) \times 100] \div 4$$

S.I. = Severity Index: It is used to rank causes of delay, based on severity of occurrence as identified by the participants.

$$S.I. = [\sum a (n \div N) \times 100] \div 4$$

Where, [a] = constant expressing weighting given to each response [(ranges from 1 for rarely up to 4 for always for F.I.) and (ranges from 1 for less up to 4 for severe for S.I.)

[n] = frequency of the responses, [N] = total number of responses.

### IV. RESULT AND ANALYSIS

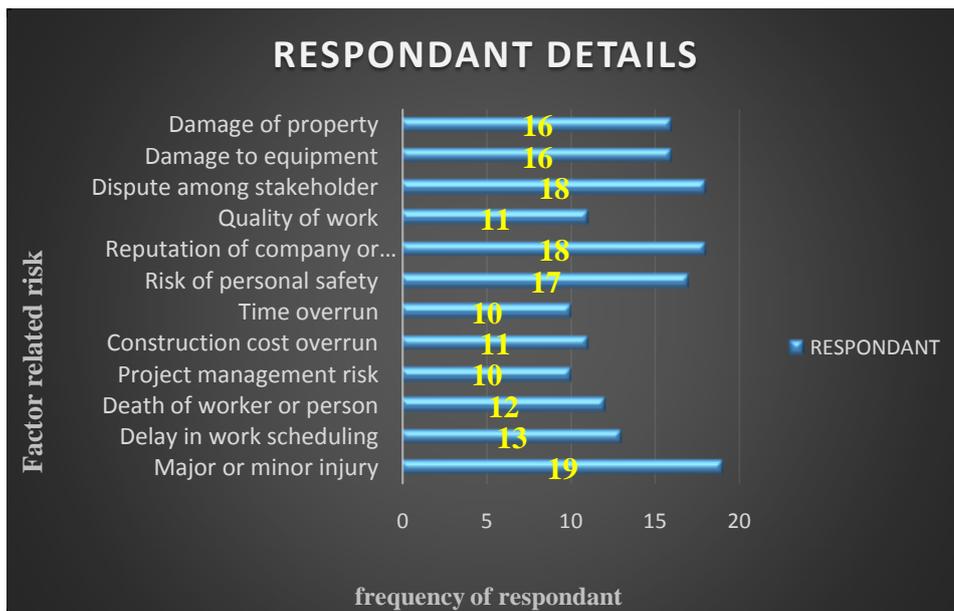
The total number of 150 questionnaires collected from the consultant, contractor, developer and site engineer at different construction site in Surat. The collection of these questionnaires occurred during the period of 3 month. Most of the answer to the questionnaires was filled by conducting interview with the different stakeholders. Some the questionnaire was filled by the distribution and then collects it.

**Table1:** Top 10 Construction accident factor of Both Methods RII and IMPI

Construction site accident factor	RII	Rank	Construction site accident factor	IMPI
Nature of project	0.9750	<b>1</b>	Living and housing facilities	79.84778
Negligent or Lack knowledge regarding wearing personal protection items	0.9733	<b>2</b>	No safety engineer at site	76.83667
Age of the worker	0.9650	<b>3</b>	Cohesiveness among person	75.54167
Due to the worker misjudgement	0.9633	<b>4</b>	Alcohol, drug during the work	73.51889
No safety engineer at site	0.9033	<b>5</b>	Correct tools/equipment were not used for specific task	73.04
Alcohol, drug during the work	0.8617	<b>6</b>	Negligent or Lack knowledge wearing regarding personal protection items	71.65083
Weather conditions	0.8600	<b>7</b>	Weather conditions	70.15889
No training program for the worker implement the job	0.8400	<b>8</b>	Non compliance to governmental safety regulation	68.28333
Non compliance to governmental safety regulation	0.8033	<b>9</b>	Lack of supervision and control on worker 'adherence to wear safety items	67.645
Appropriate personal safety procedure were not specified	0.7433	<b>10</b>	No training program for the worker implement the job	67.11833

The top most important factors that affect the construction site safety are (1) Negligent or Lack knowledge regarding wearing personal protection items (2) no safety engineer at site (3) Alcohol, drug during the work (4) Weather condition (5) No training program for the worker implement (6) Non compliance to governmental safety regulation.

**Chart 2:** Frequency analysis of accident related risk



From the questioner survey top most accident factor related risk were find out and frequency analysis of it, in which minor and major injuries risk 19 times occurs on Different site, dispute among stake holder and reputation of company are 18 times occurs, risk of personal safety 17 times occurs, damage of equipment and property risk 16 times occurs. Hence this type of risk mitigate first.

**V. CONCLUSION AND RECOMMENDATION**

From the Projects in Indian context Based on literature study and from interview of experts, 38 factors were identified under 4 major groups. After identified the factor top 10 most affecting factor has been carry out by the Relative importance index (RII) technique and Importance index (IMPI) technique. Survey Questionnaire is prepared based on RII technique and IMPI technique. Total 395 questionnaires was distributed and 150 questionnaires are getting to back at response rate. After giving rank to all the factor or Finding top 10 factor has been selected and comparison study work by RII and IMPI technique in the next phase of research. The common factor of both Method are (1) Negligent or Lack knowledge regarding wearing personal protection items (2) no safety engineer at site (3) Alcohol, drug during the work (4) Weather condition (5) No training program for the worker implement (6) Noncompliance to governmental safety regulation.

Gaining the top most factors, finding the top most risk related to that and by frequency analysis in which minor and major injuries risk 19 times occurs on different site, dispute among stake holder and reputation of company are 18 times occurs, risk of personal safety 17 times occurs, damage of equipment and property risk 16 times occurs.

**Planning before Work:** An accident report book, Training records, Workplace inspection records, Protective clothing & equipment records, Material safety data sheets (MSDS) available and Health & safety system manual.

**Post Accident Investigative Tasks :** Obtain copies of accident/police/fire report, Obtain copies of any witness statements, Record any equipment warnings and get copies of

equipment manuals and Obtain copies of construction or job site blueprints or other specifications.

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