



Study And Analysis Of Safety And Health Management In Construction Industry

P R SARANYA¹, G BALAKRISHNAN ²

1 ASSISTANT PROFESSOR 2 PG STUDENT

MASTER OF ENGINEERING IN CONSTRUCTION ENGINEERING AND MANAGEMENT

SURYA GROUP OF INSTITUTIONS, TAMILNADU, INDIA

ABSTRACT

Construction, which was basic to developmental activities provides vital infrastructure such as transport, communications, power, water, and accommodation. This project evaluates existing regulations and importance given to the safety management in the construction industry. It also discusses problems associated with enforcing safety regulations at construction sites. So, in order to identify the safety issues and problems, a questionnaire survey was conducted in sites and employees of the construction companies. From the collected data, we identify several factors which define the safety issues prevailing in the site. A detailed secondary study was conducted to view about the various problems associated with enforcing safety regulations at construction sites. The results of a questionnaire survey were used for the analysis through SPSS and ranking of the factors are found. Pareto analysis was carried out and based on the analysis it is found that the factors and sub-factors influencing safety and health management are the allocation of specific budget for safety requirements, agreement with insurance companies and financial motivation to application of safety under the main factor on economic investment and the sub factor of taking safety into account when designing a project improves safety under the main factor on project planning and design is in disagreement with safety and health management.

KEYWORDS: Construction Safety, Occupational Health, Construction Industry Hazards, Risk Assessment and Accident Prevention.

1. INTRODUCTION

Safety and health management has greater impact in construction sector. Construction is a very big network with which every country is improving their infrastructure. As India is a developing country in which infrastructure plays a vital role. Construction is second biggest occupational industry in India. At the same time the construction industry ranks high in the rates of severe and fatal occupational injuries due to complexity and unpredictable nature of the tasks as only less importance is given to the safety and health management of the workers. Throughout the world, the construction area of civil engineering is the most hazardous industry. The major causes of accidents are related to the unique nature of the industry, human behavior, difficult work site conditions and poor safety management, which results in unsafe work methods, equipment and procedures. Although regulations and plans are available, they are still under unavailable condition. Workers are not aware of their protection at their work place. Some important factors due to which the unsafe situation is continuing is human factor, legislation and financial issue. Human factor- carelessness of the workers, management on safety and construction sector and unskilled labours (lack of knowledge and practice about the work they performing). Legislation the laws, rights and acts available for safety of an employee are unknown to their knowledge (proper education should be given to the employees about their job profile and their rights at the work place). Financial issue a major problem plays a significant role why the safety and health management are poor in the industries. Understanding of risk is an important in thing on the conceptualization of risk control strategies. Most accidents on construction sites are preventable through implementation of an effective safety program. Unsafe conditions

and accidents are usually a sign that something is wrong in the management system. Basic solutions are labor-management at site, health planning and management, education and training of workers and supervisors, new technologies, federal regulation, workers' compensation law, medical monitoring, and occupational health delivery. A significant relationship between the company's attitude towards safety and the employee dedication towards the same should be noticed identified. Hence this will be helpful for improving the safety and developing a new safety culture inside the organization which improves the mental, physical, and emotional well-being of employees. Safety performance is more relevant to the human factors.

2. OBJECTIVE

To recognize and understand the importance of safety management in construction industry.
Determine the factors which mainly affect the safety and health management in construction industry.

To identify common accident at the site and analyses the reason behind accidents.

To bring the awareness regarding safety and health to the employee.

To Know their Safety-Related Rights and Responsibilities at Work.

3. SCOPE

Understanding the importance of safety and health management is made through analyzing the previous researches and study done by scholars.

Factors and sub factors influencing the safety and health Management are identified by the Delphi survey.

Weightage to the factors is interpreted by plotting the collected data in spread sheet.

Using the SPSS software ranking will be given to the factors.

Practicing the healthy culture of construction methods and producing skilled labours. Hence, it automatically increases the quality and productivity of project.

4. LITERATURE REVIEW

Gyi et al. (1998) did Case studies of occupational health management in the engineering construction industry. This paper considers seven case studies of the interviewees' perceptions of the existing situation with regard to health management. A clear perception of construction management role in safety and the prevention of injury is discussed. It is concluded by saying that Research in the area of health management of construction workers is urgently needed to provide guidance to the industry. The case studies confirmed that the limited health expertise among managers coupled with a lack of understanding of the potential role of health professionals in construction organizations, e.g., health surveillance, health and safety committees, specific health training, fitness for work and sickness absence management. The main difficulties envisaged in health management were the potential large costs involved; the sizeable, temporary and mobile work force; demonstrating cost- benefits to top management.

Peckett et al. (1998) made a comparative study of safety in culture the construction industry of Britain and the Caribbean. The concept of safety culture is concerned with managing health and safety risks. This paper examines health and safety risk management in the construction industry in two different parts of the world in order to gain a better understanding of factors that significantly impact upon the safety culture of this industry. Study includes Internal Psychological factors (attitudes, beliefs, perceptions safety climate: attitude scale interview) and External factors (behavior Risk management risk taking audit and observation, environment: climate economics history regulation equipment). Site safety management arrangements were explored during head office and site interviews at Caribbean and Britain. Both industries suffer from a lack of job security and training, effective quality management and trust. Accident and ill-health data for the construction industry are inherently unreliable due to the endemic failure to report non-fatal accidents, both in Britain and the Caribbean, and must therefore be treated with caution. The all-accident incidence rates for the Caribbean construction industry were generally half the British. The result is Caribbean construction industry faces less technological risk than British as it uses less chemicals, complex construction techniques, plant and machine.

Edwin et al. (1999) studied about Factors affecting safety performance on construction sites. This paper discusses the top five important issues found to be associated with site safety were: (1) management talk on safety; (2) provision of safety booklets; (3) provision of safety equipment; (4) providing safety environment and (5) appointing a trained safety representative on site. This research commenced by

reviewing the relevant literature on construction safety published by the Health and Safety Executive as well as Academic Journals. This was followed by exploratory interviews which took place with two operatives, two site managers and one safety. The interview discussions were focused on the causes of accidents and the attitude of workers toward safety on site. After the exploratory interviews, a pilot study questionnaire was designed and discussed with twenty personals (including the five in the exploratory interviews).

Adnan et al. (2001) factors Affecting Safety on Construction Projects. The results showed that 92.8% of respondents indicated that S&H process is negatively affected by competitive tendering. The construction managers mentioned that committed contractors who make an adequate allowance for safety and health may run the risk of losing the tender to a contractor who is less committed to safety and health. It has been observed that there is a close relationship between the age and experience of operatives and their level of safety awareness. The level of accidents tends to decline after the age of 30. The result suggests that the older the operative gets the more experienced he becomes, hence more aware of safety requirements. The results showed that management was more concerned with the problem of productivity .91.2% of the respondents believed that certain criteria such as good technical skill, training and experience should be considered as highly important to certify those who handle scaffolding. Construction managers stated that workers are reluctant to wear safety protective clothing. This is strongly related to operatives' personal attitudes towards safety protective clothing and equipment. This study indicated that management did not give enough importance to the training of operatives on how and where to use protective safety equipment and clothing.

Suchismita and Somik (2011) studied about Safety Improvement Approaches in Construction Industry. This article briefly explains nine major prevailing safety improvement approaches in the construction industry: (I) personnel selection, (ii) technological intervention, (iii) behavior modification, (iv) poster campaign, (v) quality circle, (vi) exercise and stress management, (vii) near-miss accident reporting, (viii) safety climate, and (ix) zero injury technique. The results shows that safety improvement approaches discussed above have yielded positive results and reduced accidents up to 55%. And they insisted that Safety considerations should be incorporated in the design process from the very beginning to increase the efficiency. That In country to the prevailing safety approaches, which are implemented during the actual construction phase, design is more effective as it is introduced earlier in the design phase. Hence architects and engineers are in a position to make decisions about construction safety and reduce or eliminate certain identifiable risks before those risks reach the construction site at the designing stage itself.

5. METHODOLOGY

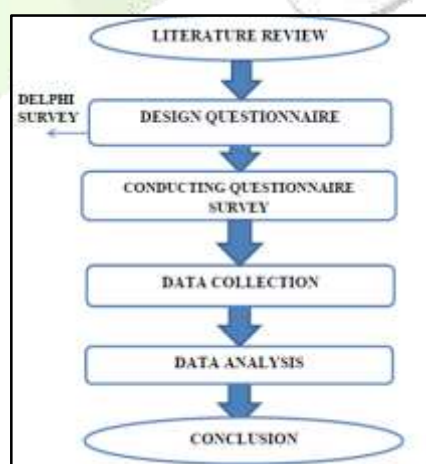


Fig:1 Methodology

6. OVER-ALL RANK OF ALL FACTORS CAUSING SAFETY AND HEALTH MANAGEMENT

6.1 DATA COLLECTION

Data is collected through the use of a questionnaire survey carried out with several factors and questions involved. In this study, factors contributing safety and health management have been obtained from various literature studies. The factors were grouped into different categories.

The data collected will be analyzed by using the relative importance index (RII) method to rank the factors contributing safety and health management. RII is used to find the topmost factor leading to safety and health management.

$$RII = \sum X_i Y_i / Z_i$$

The Over-all rank factors causing safety and health management in construction industry. The factors economic investment and personal protective equipment are strongly agreed in safety and health management with RII value of 0.311 and 0.330. while the factors safety and health policy and implementation are strongly disagreed with RII value of 0.409 and 0.400.

FACTORS	RII	RANK
Economic investment	0.311	1
Personal protective equipment (PPE)	0.33	2
Signs, signals and barricades	0.334	3
Role of government	0.359	4
Contract documents	0.36	5
Safety inspection	0.362	6
Safety organization	0.37	7
Medical and fire prevent facilities	0.37	7
Project planning and design	0.38	8
Safety and health promotion	0.38	8
Implementation	0.4	9
Safety and health policy	0.409	10

Table: 1 Over-all rank of all factors causing safety and health management

Factors	Average Weights	Standard deviation
Taking safety into account when and designing a project improves safety	1.92	0.9
Emergency plans at company decrease accidents	2	0.8
First Aid at work place improves safety	1.75	0.98
Develop a risk management plan increase safety	1.99	0.94
Addition of safety into contract clauses improves safety and ensures compliance with safety	1.79	0.91
Inclusion of contractor safety and quality records into bid awarding process decreases	1.9	0.79
Regular and systematic analysis of accidents improves safety and decrease future accidents	1.75	0.96
The organization should be formed with skilled personnel who exhibits characteristics necessary to achieve work safety objective.	1.75	0.88
The safety organization should be formed with culture and community considers safety a vital need for people	1.9	0.94
Implementation according to agreed specification in contract improves safety	1.8	0.89
Many change orders during implementation decreases productivity and increases accidents and injuries	2	0.9
Increases of material price leads to use of low quality material thus harms workers	2.19	1.1
Provision of plant and equipment maintenance	2.14	0.9
Provision of safety working environment	1.94	0.91
Conduction of safety system of works	1.96	0.85
Employment of safety officer and safety supervisor	1.79	0.94
The safety and health policy forms a part of a the company core values	1.86	1
Increase of material price leads to use of flow quality material thus harms workers	2.15	1.1
Quality assurance referring to international standards improves safety	1.9	1
Existence of written policy for quality standards improves quality	2.15	1.1
Top management commitment to safety improves quality	1.97	1
Safety engineer at work place improves safety	1.7	0.8
Absence of inspection team leads compliance of both quality and safety	1.89	0.91
The type of material made of scaffolds correct using of scaffolds	1.83	0.8
Use of PPE (gloves, helmet, etc.) decreases injuries	1.54	0.79
Lack of top management commitment to provide PPE leads to lack of attention of workers and engineers to safety	1.77	0.74
All the employees know the result of accidents and injury investigation and follow up actions	1.9	0.97
The value of safety and health area adequately defined in your company	1.97	0.92
Health assurance program helps reducing injuries	1.93	0.91
Quick transfer of construction waste out of site reduce injuries	1.85	0.85
Design of scaffolds as international specification (OSHA for example)	2.02	1.1
The use of danger signs, caution signs, traffic signs improves safety	1.56	1.2
The use of barricades to close the site for pedestrians	1.76	1.6
Issuing laws, standards, regulations and legislation improves safety	1.76	1.1
Supervision implements laws, standard, regulation and legislation of safety	1.86	1.3
The punishment in case of violation of laws, standard, regulation and legislation of safety	1.75	1.2
Periodical medical examination of workers, Permanent presence of medical specialist in the site.	1.79	0.94
Availability of adequate fire extinguishers at site	1.78	0.91
Periodic maintenance of fire extinguishers which are located in the site	1.92	0.84
Allocating specific budget for safety requirements Agreement with insurance companies	1.53	2.2
Financial motivation to application of safety		

Table: 2 Mean and SD of safety and health management in construction management

Based on mean score Allocating specific budget for safety requirements Agreement with insurance companies Financial motivation to application of safety (1.53) is the most important factor on safety and health management in construction management, followed by Use of PPE (gloves, helmet, etc.) decreases injuries(1.54), Issuing laws, standards, regulations and legislation improves safety(1.56).the least causing factor is Increases of material price leads to use of low quality material thus harms workers(2.15), followed by Existence of written policy for quality standards improves quality(2.15)

FACTORS	Project planning and design	Contract document	Safety organization	Implementation
Mean	2.95	2.44	3.65	3.83
Median	2	3	3	4
Mode	5	3	3	7
Std. Deviation	2.71	2.22	1.58	4.99
Minimum	2	2	1	1
Maximum	6	6	6	6
Sum	388	396	318	364
RII	0.38	0.36	0.37	0.4
Rank	8	5	7	9

Table :3 Statistical parameters for safety and health management factors

FACTORS	Safety inspection and health policy	Safety inspection	Personal and protective equipment	Safety and health promotion
Mean	3.95	2.44	2.25	3.83
Median	5	2	3	4
Mode	5	3	3	7
Std. Deviation	2.71	2.22	1.58	4.99
Minimum	2	2	1	1
Maximum	6	6	6	6
Sum	298	268	340	230
RII	0.409	0.362	0.33	0.38
Rank	10	6	2	8

Factors	Signs, signals and barricades	Role of Government	Medical and fire prevent facilities	Economic Investment
Mean	3.65	2.44	3.65	1.83
Median	5	5	4	4
Mode	5	3	3	7
Std. Deviation	2.71	2.22	1.58	4.99
Minimum	2	2	1	1
Maximum	6	6	6	6
Sum	278	230	268	189
RII	0.334	0.359	0.37	0.311
Rank	3	4	7	1

The data has been analyzed using SPSS version 13 software and the results have been tabulated in the above.

From the above it has been found that economic investment is found to be the most critical factor affecting the safety and health management having an RII value of .311, personal protective equipment and signs signals and barricades are the next critical factors having an RII of .334 and .330 respectively.

The least factors affecting the safety and health management of construction industry is safety inspection and health policy and implantation of safety in site having an RII of .409 and .400 respectively.

Paramater	T	DF	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
Economic investment	51.075	71	3.59052	1.2513	1.5298
Personal protective equipement	43.49	71	3.52011	1.3598	1.6804
Sign signals and barricades	50.775	71	3.76724	1.3803	1.9142
Role of government	45.792	71	3.66954	1.5108	2.1283
Contract documents	42.388	71	3.57414	1.7071	2.3412
Safety inspection	43.421	71	2.54344	1.8121	2.431
Safety organization	47.345	71	2.56787	1.923	2.5634
Medical and fire prevent facilities	51.345	71	2.72342	2.011	2.701
Project planning design	45.945	71	2.50987	2.109	2.8453
Safety and health promotion	46.876	71	2.98763	2.208	2.965
Implementation	48.786	71	2.56432	2.234	3.013
Safety and health policy	49.567	71	2.63454	2.298	3.123

Table: 4 T Test

From the above table, the T test has been carried out using SPSS software and the critical factor is found to be economic investment. The confidence level of interval having the lower and upper bound is 1.2513 and 1.5298 respectively.

7. PARETO ANALYSIS

The methodology used to do pareto analysis. This approach was developed and applied based on calculating the importance percentage of main, group and sub-factors. Pareto analysis is a statistical method in decision making that is used for the selection of a limited number of tasks that create important overall effects. In general, the Pareto analysis technique is used to help project managers identify a specific number of tasks that cause significant number of problems. The key technique to identifying these root causes is the 80/20 rule, which suggests that the focus should be on those tasks that cause 80% of the problems S.al haadir and K.panuwatwanich (2011).

7.1 STEPS IN PARETO ANALYSIS

The factor causing safety and health management is analyzed using pareto analysis. The following steps for this analysis are followed

Step 1: Calculation of the importance percentages of the main factors, by summing all the RII of each sub-factors, the equation is used to calculate the importance percentage for each main factors as shown in table

S.No	Factors	RII _i	$\beta_i = \sum$ *100%
1	Economic investment	0.311	7.125
2	Personal protective equipment (PPE)	0.33	7.56
3	Signs, signals and barricades	0.334	7.652
4	Role of government	0.359	8.225
5	Contract documents	0.36	8.247
6	Safety inspection	0.362	8.293
7	Safety organization	0.37	8.477
8	Medical and fire prevent facilities	0.37	8.477
9	Project planning and design Safety and health	0.38	8.706
10	promotion	0.38	8.706
Safety and health management		$\sum$	= 4.365

Table :5 Importance Percentage of Main Factors

Step 2: Calculation of the importance percentage of sub-factors, using the following equation

Important percentage of all the sub factors are calculated and tabulated as shown in table.

S. NO.	FACTORS	RII	RIIjk	βjk
1)PROJECT PLANNING AND DESIGN				
1	Taking safety into account when and designing a project improves safety	0.351	0.252	0.022
2	Emergency plans at company decrease accidents	0.332	0.238	0.021
3	First Aid at work place improves safety	0.352	0.252	0.022
4	Develop a risk management plan increase safety	0.36	0.258	0.022
2)CONTRACT DOCUMENTS				
1	Addition of safety into contract clauses improves safety and ensures compliance with safety	0.34	0.324	0.027
2	Inclusion of contractor safety and quality records into bid awarding process decreases	0.365	0.348	0.029
3	Regular and systematic analysis of accidents improves safety and decrease future accidents	0.345	0.329	0.027
3)SAFETY ORGANIZATION				
1	The organization should be formed with skilled personnel who exhibit characteristics necessary to achieve work safety objective.	0.365	0.495	0.042
2	The safety organization should be formed with culture and community considers safety a vital need for people	0.372	0.505	0.043
4)IMPLEMENTATION				
1	Implementation according to agreed specification in contract improves safety	0.38	0.136	0.013
2	Many change orders during implementation decreases productivity and increases accidents and injuries	0.41	0.147	0.013
3	Increases of material price leads to use of low quality material thus harms workers	0.412	0.148	0.014
4	Provision of plant and equipment maintenance	0.403	0.145	0.013
5	Provision of safety working environment	0.386	0.139	0.013
6	Conduction of safety system of works	0.391	0.14	0.013
7	Employment of safety officer and safety supervisor	0.402	0.144	0.013
5)SAFETY AND HEALTH POLICY				
1	The safety and health policy forms a part of a the company core values	0.391	0.195	0.018
2	Increase of material price leads to use of flow quality material thus harms workers	0.421	0.21	0.02
3	Quality assurance referring to international standards improves safety	0.386	0.193	0.018
4	Existence of written policy for quality standards improves quality	0.421	0.21	0.02
5	Top management commitment to safety improves quality	0.386	0.193	0.018
6)SAFETY INSPECTION				
1	Safety engineer at work place improves safety	0.36	0.327	0.027
2	Absence of inspection team leads compliance of both quality and safety	0.371	0.337	0.028
3	The type of material made of scaffolds correct using of scaffolds	0.371	0.337	0.028
7)PERSONAL PROTECTIVE EQUIPMENT (PPE)				
1	Use of PPE (gloves, helmet, etc.) decreases injuries	0.31	0.475	0.036
2	Lack of top management commitment to provide PPE leads to lack of attention of workers and engineers to safety	0.342	0.525	0.04
8)SAFETY AND HEALTH PROMOTION				
1	All the employees know the result of accidents and injury investigation and follow up actions	0.382	0.209	0.018
2	The value of safety and health area adequately defined in your company	0.39	0.213	0.019
3	Health assurance program helps reducing injuries	0.362	0.198	0.017
4	Quick transfer of construction waste out of site reduce injuries	0.322	0.176	0.015
5	Design of scaffolds as international specification (OSHA for example)	0.372	0.204	0.018
9)SIGNS, SIGNALS AND BARRICADES				
1	The use of danger signs, caution signs , traffic signs improves safety	0.318	0.468	0.036
2	The use of barricades to close the site for pedestrians	0.361	0.532	0.041
10)ROLE OF GOVERNMENT				
1	Issuing laws, standards, regulations and legislation improves safety	0.356	0.33	0.027
2	Supervision implements laws, standard, regulation and legislation of safety	0.371	0.344	0.028
3	The punishment in case of violation of laws, standard, regulation and legislation of safety	0.353	0.327	0.027
11)MEDICAL AND FIRE PREVENT FACILITIES				
1	Periodical medical examination of workers Permanent presence of medical specialist in the site.	0.367	0.327	0.03
2	Availability of adequate fire extinguishers at site	0.362	0.323	0.03
3	Periodic maintenance of fire extinguishers which are located in the site	0.392	0.35	0.032
12)ECONOMIC INVESTMENT				
1	Allocating specific budget for safety requirements Agreement with insurance companies Financial motivation to application of safety	0.307	1	0.071

Table 6. Importance Percentage for Sub-Factor

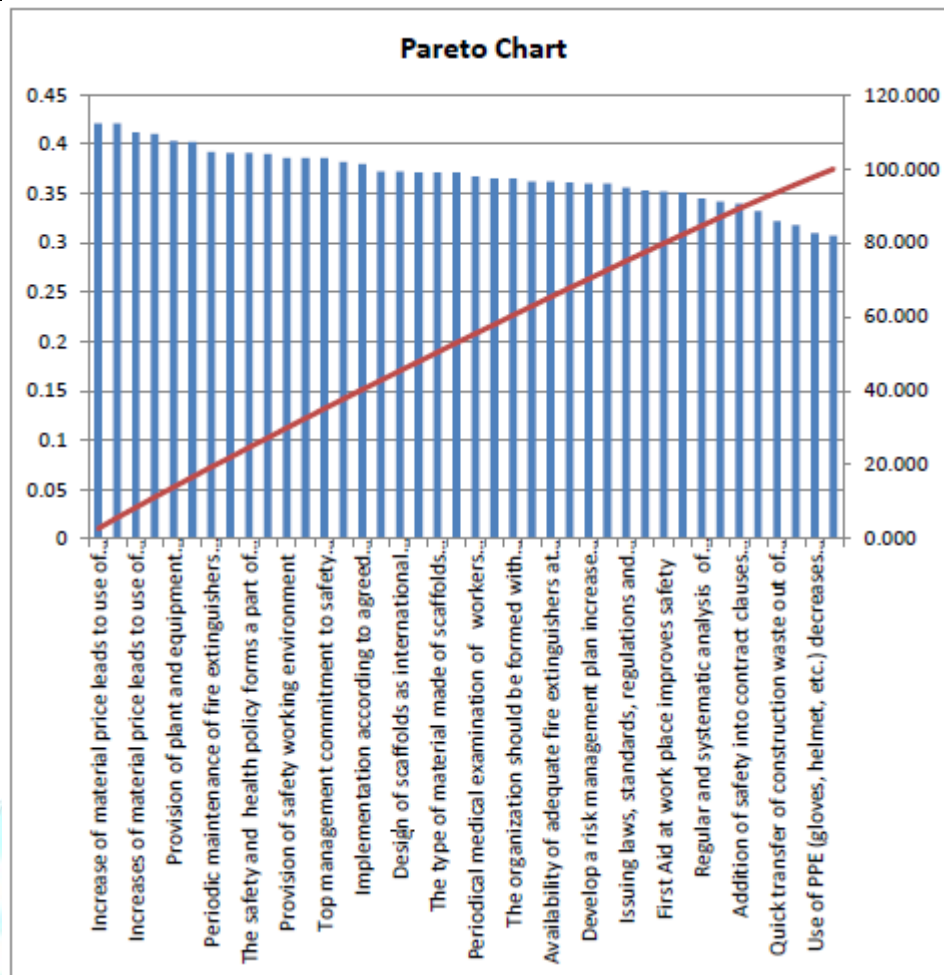


Fig: 2 Pareto chart of all sub factors

Based on the calculated importance percentage of all the sub factors a pareto chart has been formulated in MS excel and the following inference has been made.

The red curve in the chart represents the cumulative percentage of all the sub factors.

Out of all the sub factors nine have been found to be more prioritized

These nine factors are as follows

1. Allocating specific budget for safety requirements Agreement with insurance companies' financial motivation to application of safety
2. Use of PPE (gloves, helmet, etc.) decreases injuries
3. The use of danger signs, caution signs, traffic signs improve safety
4. Quick transfer of construction wastes out of site reduce injuries
5. Emergency plans at company decrease accidents
6. Addition of safety into contract clauses improves safety and ensures compliance with safety
7. Lack of top management commitment to provide PPE leads to lack of attention of workers and engineers to safety
8. Regular and systematic analysis of accidents improves safety and decrease future accidents
9. Taking safety into account when and designing a project improves safety

By pareto rule prioritizing these nine factors safety and health management in construction project can be improved.

8. CONCLUSIONS

The study identified several health and safety management issues in Construction project. This study was under taken to recognize and understand the importance of safety management in construction industry.

The factors which mainly affect the safety and health management in construction industry were determined through a questionnaire survey. The data obtained from the survey was analyzed in SPSS, pareto and the key indicator which affects the quality of construction were identified and ranked.

FACTORS	RII	RANK
Economic investment	0.311	I
Personal protective equipment (PPE)	0.33	2
Signs, signals and barricades	0.334	3
Role of government	0.359	4
Contract documents	0.36	5
Safety inspection	0.362	6
Safety organization	0.37	7
Medical and fire prevent facilities	0.37	7
Project planning and design	0.38	8
Safety and health promotion	0.38	8
Implementation	0.4	9
Safety and health policy	0.409	10

Table :7 Over-all rank of all factors causing safety and health management

The economical investments in a project are found to be more critical. The sub factor- Allocating specific budget for safety requirements is given the most priority. Material quality, financial issues and labor management are the other key factors which affects the quality of construction projects. Use of personal protective equipment and sign signals barricades decreases the number of accidents in construction site. common accident at the site was identified and the reason behind accidents was analyzed. The least affecting factor is Top management commitment to safety in improving quality and safety inspection. Additional investment has to be made in order to increase the level of safety at site. Insurance, personal protective equipment's, barricades, signs have to be provided for the labor at site. Various construction sites were survived and based on the responses obtained from the site engineers and workers recommendations to improve safety and health management were derived. The various recommendations to be followed based on analysis are discussed below.

RECOMMENDATION

Awareness must be created among all employees about the functioning of Safety Committee and encourage them to report on any safety related issues

Safety Committees headed by Project Managers should be formed and frequently meet to discuss matters related to safety

Effective induction training programmers should be conducted for the new recruits.

Work procedures should be reviewed periodically

Well qualified experienced Safety Officers should be employed

Regular meetings should be conducted and relevant safety issues should be discussed to ensure that workers are aware of the dangers and take precautionary measures to avoid them.

Warning signs should be erected at appropriate locations

Awareness on the importance of PPE should be prioritized

Site Supervisors should enforce that all the workers must be equipped with PPE and wear them while on duty.

Managers must pay more attention to health and safety management issues within his command area.

Managers must get involved in all matters relevant to safety.

Officials from the Labor Department should visit the construction sites randomly to check the compliance.

Further research on Health and Safety Management in construction projects specifically in Economic investment, Personal protective equipment (PPE), Signs, signals and barricades are suggested to improve the health and safety of the workers engaged in construction work.

APPENDIX I: QUESTIONNAIRE

1. Name of the Company		_____	
2. Type of project			
Residential building	☐	Commercial building	☐
☐ Roads & transportation construction	☐	Industrial	☐
Others	☐	Specify	_____
3. Total Number of Employees		_____	
4. Type of Company			
Owner	☐	Consultant	☐
		Contractor	☐
5. Title of position of respondents			
Project manager	☐	Site engineer	☐
		Labor	☐
WORKPLACE DETAILS:			
1 Approximately how many employees are there in your company?			
1-10	☐	11-20	☐
		21-30	☐
		31-40	☐
41-60	☐	61-80	☐
		80+	☐

APPENDIX II: QUESTIONNAIRE

Strongly agreed -1		Agreed-2		Neutral-3		Disagree-4		Strongly disagree-5	
NO	FACTORS	1	2	3	4	5			
1)PROJECT PLANNING AND DESIGN									
1	Taking safety into account when and designing a project improves safety								
2	Emergency plans at company decrease accidents								
3	First Aid at work place improves safety								
4	Develop a risk management plan increase safety								
2)CONTRACT DOCUMENTS									
1	Addition of safety into contract clauses improves safety and ensures compliance with safety								
2	Inclusion of contractor safety and quality records into bid awarding process decreases								
3	Regular and systematic analysis of accidents improves safety and decrease future accidents								
3)SAFETY ORGANIZATION									
1	The organization should be formed with skilled personnel who exhibits characteristics necessary to achieve work safety objective.								
2	The safety organization should be formed with culture and community considers safety a vital need for people								
4)IMPLEMENTATION									
1	Implementation according to agreed specification in contract improves safety								
2	Many change orders during implementation decreases productivity and increases accidents and injuries								
3	Increases of material price leads to use of low quality material thus harms workers								
4	Provision of plant and equipment maintenance								
5	Provision of safety working environment								
6	Conduction of safety system of works								
7	Employment of safety officer and safety supervisor								
5)SAFETY AND HEALTH POLICY									
1	The safety and health policy forms a part of a the company core values								
2	Increase of material price leads to use of flow quality material thus harms workers								
3	Quality assurance referring to international standards improves safety								
4	Existence of written policy for quality standards improves quality								
5	Top management commitment to safety improves quality								
6)SAFETY INSPECTION									
1	Safety engineer at work place improves safety								
2	Absence of inspection team leads compliance of both quality and safety								
3	The type of material made of scaffolds correct using of scaffolds								
7)PERSONAL PROTECTIVE EQUIPMENT (PPE)									
1	Use of PPE (gloves, helmet, etc.) decreases injuries								
2	Lack of top management commitment to provide PPE leads to lack of attention of workers and engineers to safety								
8)SAFETY AND HEALTH PROMOTION									
1	All the employees know the result of accidents and injury investigation and follow up actions								
2	The value of safety and health area adequately defined in your company								
3	Health assurance program helps reducing injuries								
4	Quick transfer of construction waste out of site reduce injuries								
5	Design of scaffolds as international specification (OSHA for example)								
9)SIGNS, SIGNALS AND BARRICADES									
1	The use of danger signs, caution signs , traffic signs improves safety								
2	The use of barricades to close the site for pedestrians								
10)ROLE OF GOVERNMENT									
1	Issuing laws, standards, regulations and legislation improves safety								
2	Supervision implements laws, standard, regulation and legislation of safety								
3	The punishment in case of violation of laws, standard, regulation and legislation of safety								
11)MEDICAL AND FIRE PREVENT FACILITIES									
1	Periodical medical examination of workers Permanent presence of medical specialist in the site.								
2	Availability of adequate fire extinguishers at site								
3	Periodic maintenance of fire extinguishers which are located in the site								
12)ECONOMIC INVESTMENT									
1	Allocating specific budget for safety requirements Agreement with insurance companies Financial motivation to application of safety								

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