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EVALUATING SAFETY PERFORMANCE IN CONSTRUCTION PROJECTS BY USING MS EXCEL

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1. ABSTRACT

In the urbanized and rising countries, the construction firm is known to be one of the most important industries in terms of its effect on health and safety of the Working people. Construction firm is both financially and socially important. Though, the construction firm is also familiar to be the most dangerous. This study is to enhance the safety performance of the construction works. And it is to understand the actual safety problems and hazard of injuries that occurs in construction works. It is to examine safety procedures, rules, policies and accident avoidance methods related to the construction works and to provide methods and suggestions to enhance the safety performance in construction works to decrease the accident and mortal rate. Suggestion and recommendation are made from the questionnaire based data gathering from the construction and that are given to contractors and workers to advance the safety performance.

2. INTRODUCTION

In recent years the concept of safety culture has attracted considerable attention especially in the dangerous industries, such as the nuclear industry and off-shore oil industry. The construction industry is regarded as a dangerous industry due to two characteristics; decentralization and mobility. The meaning of decentralization is that the employees are separated by sites. even though rules and plans are available, they still have to make decision by themselves when facing specific problems. Mobility implies that employees in the construction industry move among the companies, sites, and positions more frequently than those in their traditional industries. Because of these two characteristics, while the promotion of safety management and working condition is achieved in a manner that is used by several industries to consciously improve safety performance, they are inadequate in the construction industry .This is due to decentralization and mobility of the work force. One of the reasons is that in the construction industry, safety performance is more relevant to the human factors. It is particularly significant for a construction firm to advance its safety culture to achieve better safety performance. A constructive safety culture means the safety approach and values of the company are totally accepted by its employees. In the urbanized as well as urbanizing part of the world, construction firm is considered to be one of the most significant industries in terms of contributing to GDP and also in terms of its effect on health and safety of the working people. Construction industry is both economically and socially important. Research shows that the important reason of the accidents are related to the unique things of the firm, human behaviour, difficult work site conditions, and poor safety management, which result in unsafe work methods, equipment and procedures. Emphasis in both growing and grownup countries needs to be placed on education and the utilization of comprehensive safety programs.

Objectives

The objectives of the study are:

To explore the existing safety procedures, regulations, policies and employee values, attitudes and perception about safety of the construction companies

To find safety performance measurement of various construction firms in and around of tamilnadu

To understand the safety problems that occurs in the building construction

To identify the roots of construction safety problems

To give suggestion and recommendation to enhance the safety procedures

To develop a strategy that makes safety an integral part

Scope of the Study

This project provides information about various works involved in the construction industry and the safety measures adopted by the companies

To make the employee aware of the safety norms and procedures of their companies

In a developing nations like India, safety is important because of lack of social security Thus, it becomes essential to think certain safety measures to prevent accidents

Research Significance

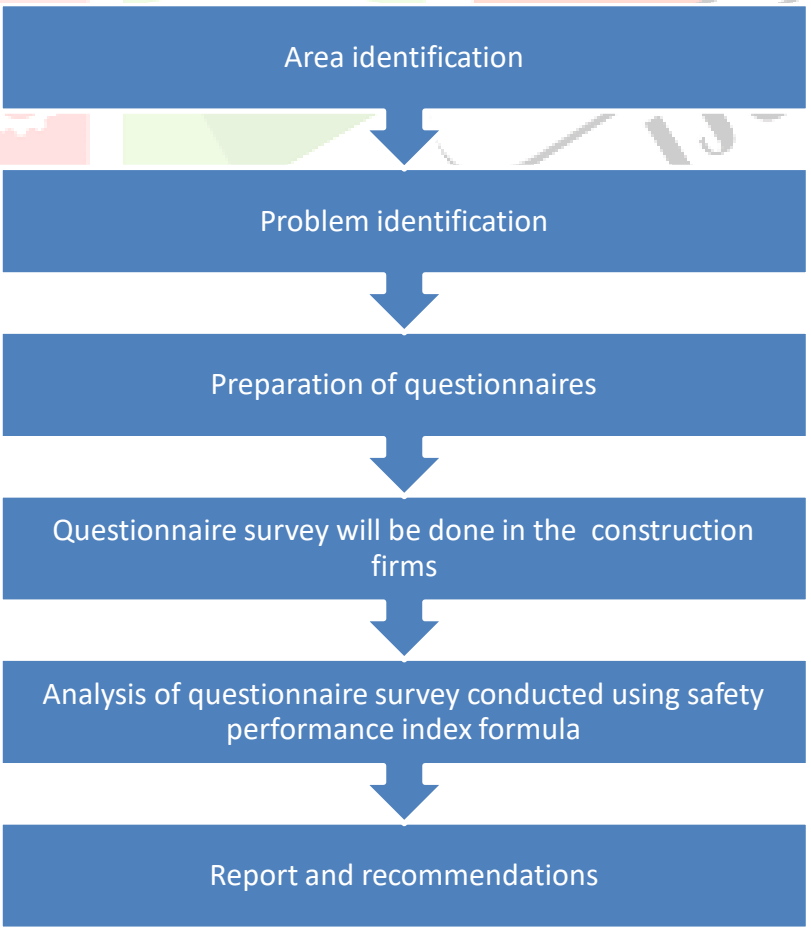
Construction accidents have been causing many human tragedies, loss of life, productivity, and delay projects. The main reason for selecting this topic was the need for improving safety performance in the Tamilnadu other reasons for would be:

The lack of studies about the safety issues of construction in the Tamilnadu

To give some ideas to help construction firms

to improve safety performance on the construction sites.

3. METHODOLOGY



4. EXPERIMENTAL WORK

The experimental program comprises the following stages

- **Preparation of questionnaires**
- **Questionnaire survey in the construction firms**
- **Analysis of questionnaire survey**
- **Report will be prepared and recommendations will be given based on analysis**

Questionnaires General

The aim of the questionnaire to realize the real safety problems, injuries and danger/hazard that may occur in construction projects and to investigate safety procedures, regulations, policies, and accident prevention methods related to the construction projects in construction.

Preparation of Questionnaires

Following the literature review, a safety investigation Performa was developed to elicit information about construction safety performance at different sites. Which covers various aspects of site safety measurement.In the next step, site observation surveys will be conducted on sites. As a preference, building construction sites constituting scaffolding operations and working on heights operations were selected. Some snapshots will also been taken as evidence of the observations and also for confirming the validity of the observations.In the final step, findings based on the observations are then used to analyze the site safety performance of the construction industry. Some conclusions and recommendations will be drawn based on the analysis of the data.

Questionnaire Survey

The questionnaire survey is done in the construction company located in and around tamilnadu and the companies selected are based on their financial standing

Survey Details

Development of questionnaire along with factor condition of quantification of construction safety is used. These questionnaires were distributed among the contractors, engineers, and the collection of data was carried out to 50 contractors and engineers, only 40 contractors answer the questionnaire 10 contractors were unable to provide the data. (Response rate of 80%).

Questionnaire

Questionnaire was designed to study more about the safety management practices in the construction industry and ways to improve safety performance in construction works. The questionnaires were prepared with reference of literature reviews, contractors, engineers, project managers and consultant.

STATEMENT	Yes	No	Maybe/sometimes
MARKS	3	1	2

4.1 QUESTIONNAIRE SAMPLE

Q.NO	QUESTIONNAIRE	YES	NO	MAYBE/SOMETIMES
1	Is there any mishap happens in your site?			
2	Is there any safety training programs is conducted			
3	Is there safety instruction given to workers commencing projects			
4	Is there any punishment awarded to worker who not following safety instruction			
5	Is there any training program for the new workers regarding safety measures			
6	Is there any safety monitoring personnel employed			
7	Whether any insurance policy has been taken to cover the risk against men and materials			
8	Whether there is adequate unit such as Fire protection First aid			
9	Is there any communication facilities to handle hazardous situation			
10	Whether any amount earmarked to meet the safety measure is included in project cost it self If yes a. 0-1% b. 1-2% c. 2-3% d. morethan 3			
11	Is there any fund allocated made available with site in charge to meet emergency expenditure			
12	Whether the workers has undergone periodical medical check up			
13	Did you have specific safety checklist for each and every work			
14	Is there provision of personal protective equipments such as Safety helmets, Safety eye wear, Safety gloves, Safety jackets, Safety shoes			
15	Is there any special provision for working at height			
16	Is there any special provision for working near electric power lines			
17	Is there any special provision for working in depth			
18	Is there proper housekeeping in your site			
19	Is there provision for proper barricading to the adjoining structures			
20	Did you noticed any possible hazard in your last visit			

4.2 DATA ANALYSIS

The aim of the statistical analysis is to find the significances with respect to safety issues in construction industry. The data, usable returned questionnaires collected by means of questionnaire survey were entered, coded and analysis by use of statistical software, SPSS (statistical package for social sciences) and Microsoft excel

Following are detailed result of various statistical test done using SPSS, each and every result has been punctuated with tables, figures, graphs and other representations. According to the response from the construction sites, suggestions are given and alternatives regarding safety are developed. Parameters were assessed based on following scale:

Three point scale

1. Yes
2. No
3. Maybe/sometimes

Analysis by Using Microsoft Excel

Micro Soft Excel provides facilities for analyzing and displaying information using a weighted average technique. This document uses version 2007 of MS excels software for windows.

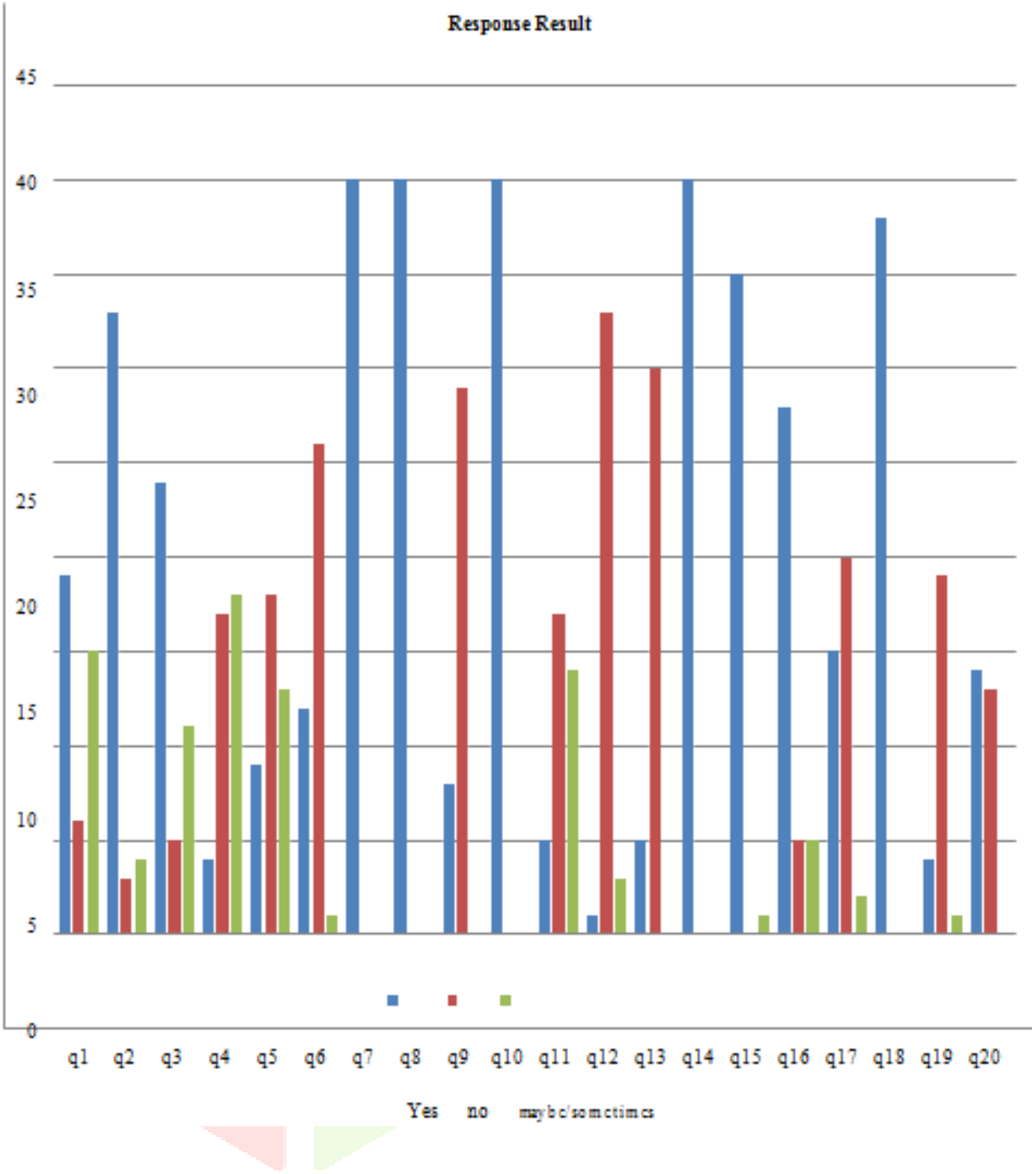
Weighted average is calculated by using following formula

$$\frac{[(\text{Number of votes} * \text{Weighting for column 1}) + (\text{Number of votes} * \text{Weighting for column 2}) + (\text{Number of votes} * \text{Weighting for Column 3})]}{\text{Total Number of Votes}}$$

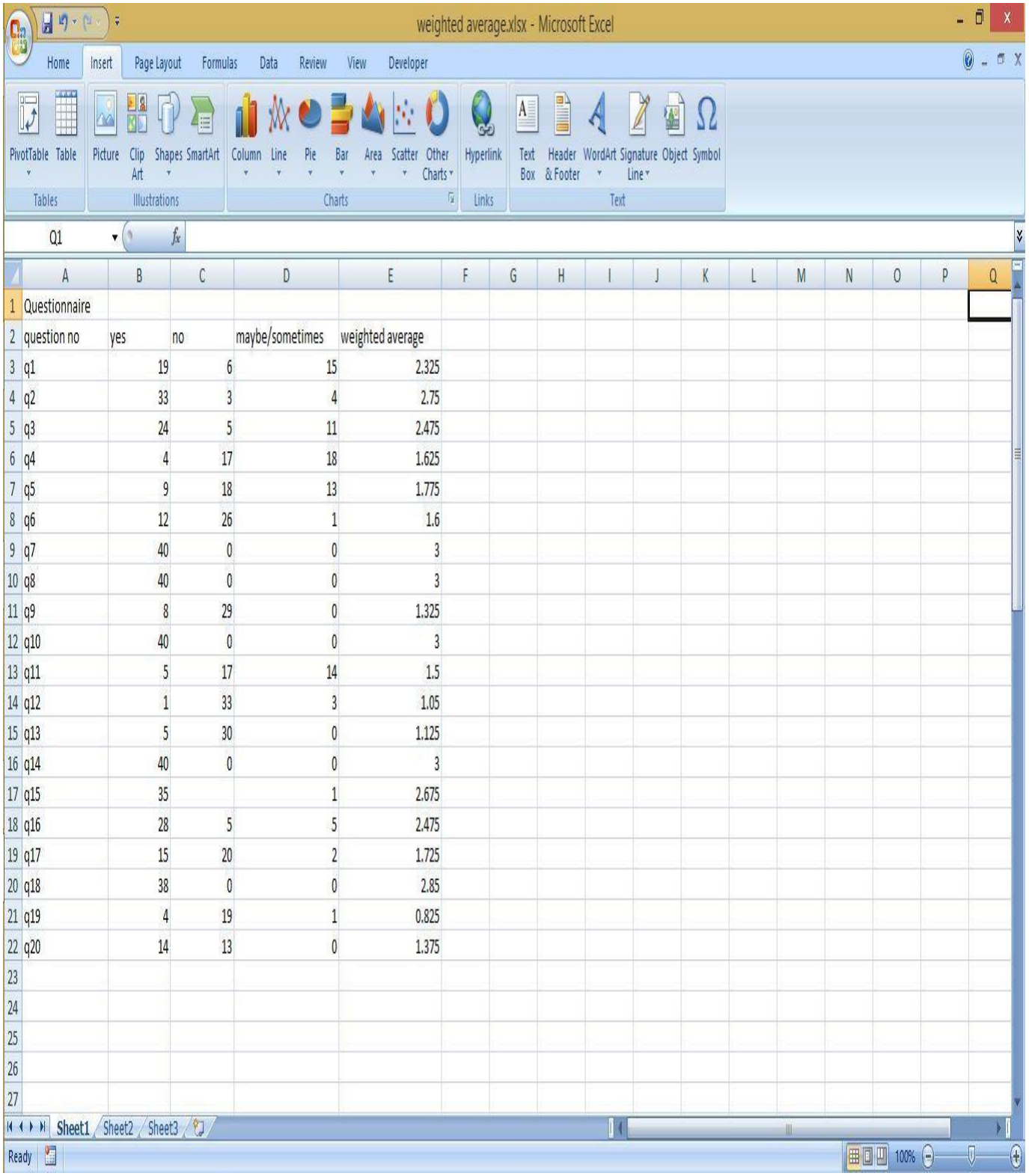
Response Rate

Question No	Yes	No	Maybe/Sometimes	Weighted Average
q1	19	6	15	
q2	33	3	4	
q3	24	5	11	
q4	4	17	18	
q5	9	18	13	
q6	12	26	1	
q7	40	0	0	
q8	40	0	0	
q9	8	29	0	
q10	40	0	0	
q11	5	17	14	
q12	1	33	3	
q13	5	30	0	
q14	40	0	0	
q15	35		1	
q16	28	5	5	
q17	15	20	2	
q18	38	0	0	
q19	4	19	1	
q20	14	13	0	

Response result graph for all questions


Response Result
45
40
35
30
25
20
15
10
5
0
q1 q2 q3 q4 q5 q6 q7 q8 q9 q10 q11 q12 q13 q14 q15 q16 q17 q18 q19 q20
Yes
no
maybe/somctimes

Weighted average for all questions in MS EXCEL

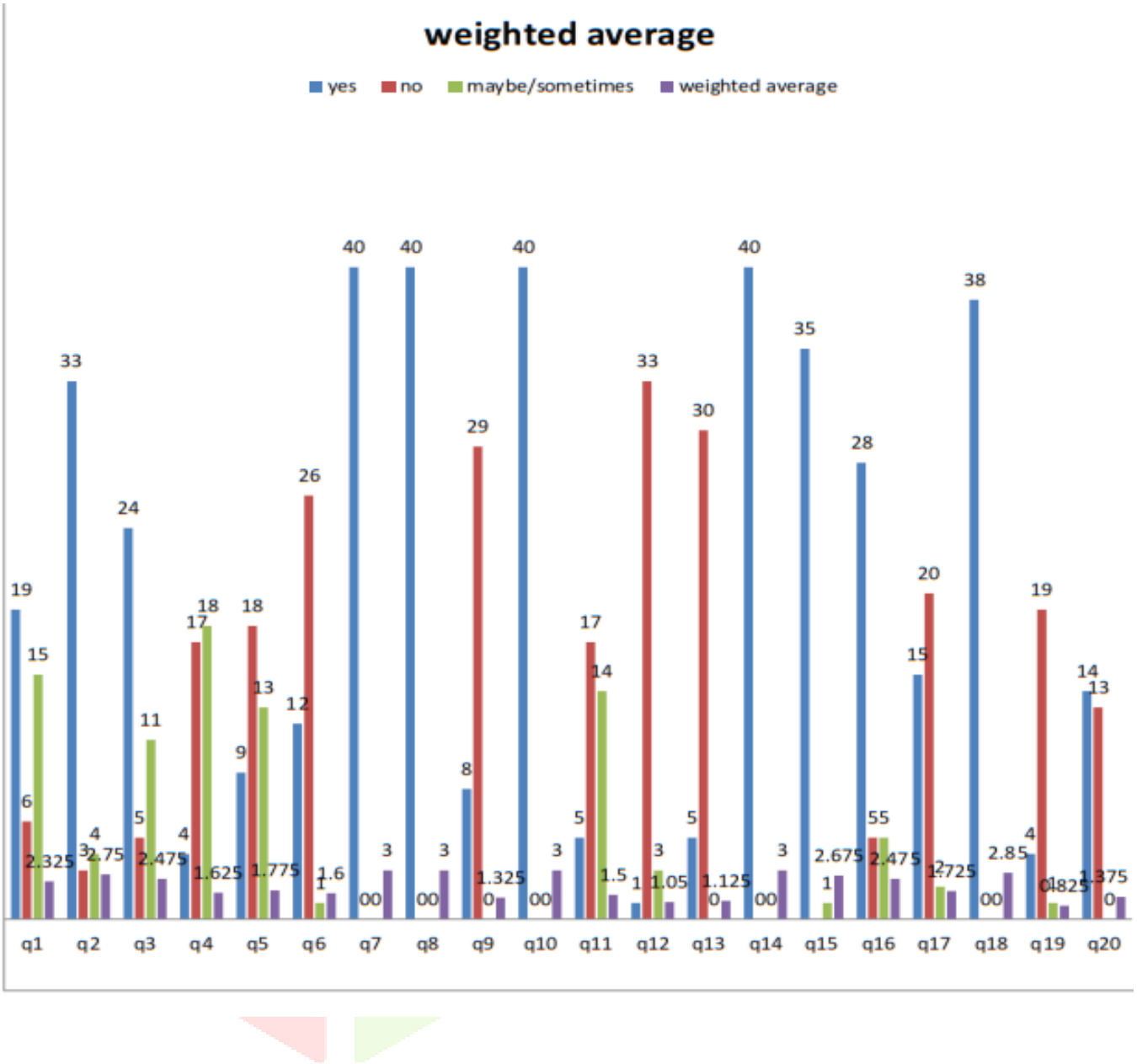


	A	B	C	D	E
1	Questionnaire				
2	question no	yes	no	maybe/sometimes	weighted average
3	q1	19	6	15	2.325
4	q2	33	3	4	2.75
5	q3	24	5	11	2.475
6	q4	4	17	18	1.625
7	q5	9	18	13	1.775
8	q6	12	26	1	1.6
9	q7	40	0	0	3
10	q8	40	0	0	3
11	q9	8	29	0	1.325
12	q10	40	0	0	3
13	q11	5	17	14	1.5
14	q12	1	33	3	1.05
15	q13	5	30	0	1.125
16	q14	40	0	0	3
17	q15	35		1	2.675
18	q16	28	5	5	2.475
19	q17	15	20	2	1.725
20	q18	38	0	0	2.85
21	q19	4	19	1	0.825
22	q20	14	13	0	1.375
23					
24					
25					
26					
27					

Weighted Average

Question No	Yes	No	Maybe/Sometimes	Weighted Average
q1	19	6	15	2.325
q2	33	3	4	2.75
q3	24	5	11	2.475
q4	4	17	18	1.625
q5	9	18	13	1.775
q6	12	26	1	1.6
q7	40	0	0	3
q8	40	0	0	3
q9	8	29	0	1.325
q10	40	0	0	3
q11	5	17	14	1.5
q12	1	33	3	1.05
q13	5	30	0	1.125
q14	40	0	0	3
q15	35		1	2.675
q16	28	5	5	2.475
q17	15	20	2	1.725
q18	38	0	0	2.85
q19	4	19	1	0.825
q20	14	13	0	1.375

Weighted average graph for all questions



The response result for the questionnaire is shown in table 1 and response result graph with the counts of yes, no and maybe/sometimes. And table 2, weighted average graph shows that the weighted average of response yes, no, maybe/sometimes respectively.

Overall, we can see that of the 20 questionnaire, questions 7, 8, 10, 14 rated most highly, with an average weighted score of 3

Those Highly rated questions are

7. Whether any insurance policy has been taken to cover the risk against men and materials
8. Whether there is adequate unit such as
   Fire protection
   First aid
10. Whether any amount earmarked to meet the safety measure is included in project cost it self

14. Is there provision of personal protective equipments such as

    a. Safety helmets
    b. Safety eye wear
    c. Safety gloves
    d. Safety jackets

e. Safety shoes

4.3 Site Observation

During my visit I noticed that, they are not following safety but in the questionnaire they told that they are strictly following the safety

For instance

- No barricades are used while lifting materials like cement bags, bricks, etc.
- Electrical place are not closed and wires are set free in ground
- No proper safety measure are taken while using chemicals
- Housekeeping is not done properly
- No proper safety in scaffolding
- No proper platform for workers who dose plastering Personal protective equipments are not worn by workers No barricades are used in lift opening, and so on...

5. CONCLUSION

Owner is not ready to take part of any safety during construction time in few companies contractors demand the workers to do the work with preventative measures even they said they are following they are not ensure the safety.

From the outcome in the questionnaire survey it was found that, accidents takes in most of the construction sites. The reason was no appropriate safety training education conducted, no penalty awarded for not following safety, no exact safety monitoring staff and short of communication. Concerning the cost of the construction safety measure, the most of the respondents agreed that the cost of safety less than three percentage. There were lots of potential hazards in the construction sites that will lead to injures, or sickness between the workers on the construction sites.

On the existing safety measures, regulations, policies, and accidents avoidance methods related to the construction works; there was cooperation among the respondents that execution of safety rule helps in dipping accidents. Construction workers should take part in more active roles in supporting construction safety and in improving safety for construction labors. There was also a agreement between the respondents that duty for safety and health was only confined to construction work on site.

The respondents granted on the insufficient methods that can help to increase safety performance in the construction works, accident exposure, contractors/owners' safety conditions relationship, penalties, and safety meeting.

Regarding the tools most wide used and obtainable in construction sites, aid bag and helmet came on high of the list. Concerning officers, the govt. ought to give special programs and follow up the protection performance on the construction site and visits all construction comes to see for any violation within the construction sites. On the role of contractors, consultants, and owners, safety programs, like staff training, education and direction ought to be project the safety culture on the construction site. Finally, the respondents in agreement that insurance underwriter should visit construction site that are insured.

REFERENCE

1. **Amr A.G.Hassanein and Ragaa S.Hanna (2008),** "Safety Performance in the Egyptian Construction" *Journal of Construction Engineering and Management, Vol. 134, No. 6, June 1, ASCE, pp 451-455*
2. **Bonaventura H.W.Hadikusumo & Kin Dorji (2006)**, "safety management practices in the Bhutanese construction industry" *Journal of Construction in Developing Countries, vol. 11, no. 2, 2006*
3. **Kanchana Priyadarshani, Gayani Karunasena and Sajani Jayasuriya (2013)** "Construction Safety Management Assessment Framework For Developing Countries: A Case Of Srilanka" *Journal of Construction in Developing Countries, Penerbit Universiti Sains Malaysia,2013*
4. **Mohammad S. El-Mashaleh, Bashar, M. Al-Smadi, Khalied H. Hyari and Shaher M. Rababeh (2010)** "Safety Management In The Jordanian Construction Industry" *Jordan Journal of Civil Engineering, Volume 4, No.1, 2010*
5. **RizwanU.Farooqui, Farrukh Arif, S.F.A. Rafeeqi,** "Safety Performance In Construction Industry Of Pakistan" *First International Conference on Construction In Developing Countries (ICCIDC–I)*
6. **SomikGhosh, Suchismita Bhattacharjee**, "Safety Improvement Approaches In Construction Industry: A Review And Future Directions" *47th ASC Annual International Conference Proceedings*

7. **A.Hemamalinie, A.J.Jeyaarthi, Dr L.Ramajeyam (2014) "** Behavioural Based Safety Culture In The Construction Industry**"** *International Journal of Emerging Technology and Advanced Engineering, Volume 4, Special Issue 4, June 2014)*
8. Improving Construction Safety Performance, Report A-3, January, 1982, Reprinted July, 1990
9. **Abdelhamid, T. S., and Everett, J. G. (2000).** ''Identifying root causes of construction accidents.'' *J. Constr. Eng. Manage.*, 126(1), 52-60.
10. **Ahmed, Syed M., Kwan C., Young W. M. & Pui, C. H. (2000)**. "Site Safety Management in Hong Kong," *Journal of Management in Engineering*, ASCE, 16(6), pp. 34-42.
11. Construction Safety - A Monograph by Manas Kumar Pathak and Ashis Kumar Panda
12. **Jain SK.** Meeting the challenges in industrial safety management in construction works, Conference Proceeding, Vol. 1, 2007, pp. 40-48.
13. **Helander MG.** Safety hazards and motivation for safe work in the construction industry, International Journal of Industrial Ergonomics, 3(1991) 205-23.
14. **Cohen, J. M. (2002**). "Measuring safety performance in construction." *Occup. Hazards*, 64(6), 41–44.
15. **Farooqui, R.U., Ahmed, S.M., and Panthi, K. (2007).** "Developing Safety Culture in Pakistan Construction Industry – An Assessment of Perceptions and Practices among Construction Contractors". *Proceedings of the Fourth International Conference on Construction in the 21st*
16. **Flin, R., Mearns, K., O'Connor, P., and Bryden, R. _2000_.** "Measuring safety climate: Identifying the common features." *Safety Sci.*, 34(1–3), 177–192.
17. **Hassanein, A. G., and Hanna, R. S.** (2008) "Safety Performance in the Egyptian Construction Industry" *J. Constr. Eng. Manage.*,. Vol. 134, No. 6, June 1, 2008, 451-455
19. **Huang, X, and Hinze, J. (2006).** "Owner's role in construction safety." Journal of Construction Engineering and Management, 132 (2), pp 164-173.
20. **Huang, X., Fang, D., and Li, X. (2000).** ''Construction accident losses: How much an accident costs.'' *Proc. 2000 Int. Symp. on Safety Science and Technology*, Chemical Industry Press, Beijing, 320–325
21. **Koehn, E., Kothari, R.K. and, Pan, C. (1995).** "Safety in developing countries: professional and bureaucratic problems." Journal of Construction Engineering and Management 121(3), pp 261-265.
22. **Mohamed, Sherif (2003).** "Scorecard Approach to Benchmarking Organizational Safety Culture in Construction" *J. Constr. Eng. Manage.*, 129(1), 81-88.
23. **Rowlinson, S. (2003**). *Hong Kong construction —Safety management and the law*, Sweet & Maxwell Asia, Causeway Bay, Hong Kong.
24. **Samelson, N.M.,** and Levitt, R. E. (1982). "Owner's guidelines for selecting safe contractors." *J. Constr. Div.*, ASCE, 108 (4), 617-623.