



IMPROVEMENT OF INSPECTION SYSTEM FOR REDUCTION OF SMALL-SCALE CONSTRUCTION SITE ACCIDENT

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Abstract: The Construction projects are generally complex and sometimes unsafe and thus require continuous monitoring and proper planning throughout project life cycle. The Construction industry is one of the most dangerous workplaces, not only in developing countries but also throughout the world due to unique nature of construction on every project because of high incidence of accidents.

Researchers have focused on how risky acts and unsafe conditions affect safety performance, yet common knowledge that injuries/accidents are linked to poor supervision.

Due to labor-intensive production process and other factors, the construction industry is subject to significant financial loss as result of occupational accidents, in the construction industry, there are 60,000 fatal accidents annually, and every 10 minutes, a worker loses their life due to an occupational accident.

The collect Data to various sites including Residential and Commercial projects. In order to collect appropriate data and information for the study, various sources have been utilized. I have use the RII method and The top factors determined by the study were (1) Lack of knowledge of the work, (2) Lack of regular supervision at least once per week, (3) Attitude of contractor's and labours' safety, (4) Poor management awareness of safety, (5) Poor awareness of safety project director, (6) Workers are unlikely to report incidents/accidents, (7) Insufficient knowledge of the workers, (8) Lack of training, (9) Daily safety inspection by supervisor, (9) Lack of safety awareness, and (10) Lack of safety awareness.

It is recommended in the construction industry that the contractor confirm that all workers are wearing PPE and penalty workers who do not follow the safety rules.

Index Terms – Type of accident and number of death, Questionnaire survey, success factors affecting construction site safety, RII Method

I. INTRODUCTION

In the history of industries worldwide, sites have emerged as the industries with the highest risk. The most current industrial accident report from the Ministry of Employment and Labor of Korea (MOEL) shows that the rate of accidents across all industries declined from 0.78 percent in 2007 to 0.6 percent in 2016, but grew from 0.72 percent in 2007 to 0.84 percent in 2016. In 2015, Korea had a total of 1,021,737 building sites. The small-scale building (with budget of up to \$272, 0000(£232, 0000)) was 785,350, accounting for 77% of total.

The number of workers who experience a work-related illness or injury out of every 105 workers is known as the accident rate. The number of deaths from industrial accidents in the construction industry in Korea from 2013 to 2017 was 2,598 (524 deaths per year on average), accounting for 34.43 percent of all deaths from industrial accidents, according to moel statistics. This makes it the industry with the highest death rate due to industrial accidents. Large-scale (projects with a budget above \$10.92 million (£9.23 million)) and medium-scale (projects with a budget between \$275,000 (£231,000) and \$10.92 million (£9.23 million)) construction projects are generally covered by construction safety and health standards.

Predicting future accidents and their character under certain conditions is typically necessary for accident prevention in the construction industry. Such forecasts must be based on information of previous accidents. The primary reasons for accidents include the uniqueness

of the industry, human nature, working circumstances, and inadequate safety management, which leads to risky work procedures (CII1990).

Construction Due to labor-intensive manufacturing methods and other factors, the construction industry is subject to significant financial loss as a result of occupational accidents. Every year, there are 65,000 fatal accidents in the construction industry, and every 15 minutes, a worker loses their life as a result of one of these incidents.

Following are the main concepts within Improve inspection system

1. Survey of site and reduction of site accidents
2. Communicate with People
3. Type of Hazards and accidents

II. OBJECTIVES

There are identify the main factors affecting construction site safety. The study involved going to numerous construction sites and utilizing a questionnaire to gather information about the number of workers, their nativity, the total number of hours worked, and the work shifts.

III. SCOPE

This research work is basically dealing with the role of improve of inspection system commercial area in present construction industry. The work is restricted to Ahmedabad and Gandhinagar zone. To evaluate and improve the construction safety at site. The Survey will be conducted across various construction sites in Ahmedabad and gandhinagar.

IV. RESEARCH METHODOLOGY

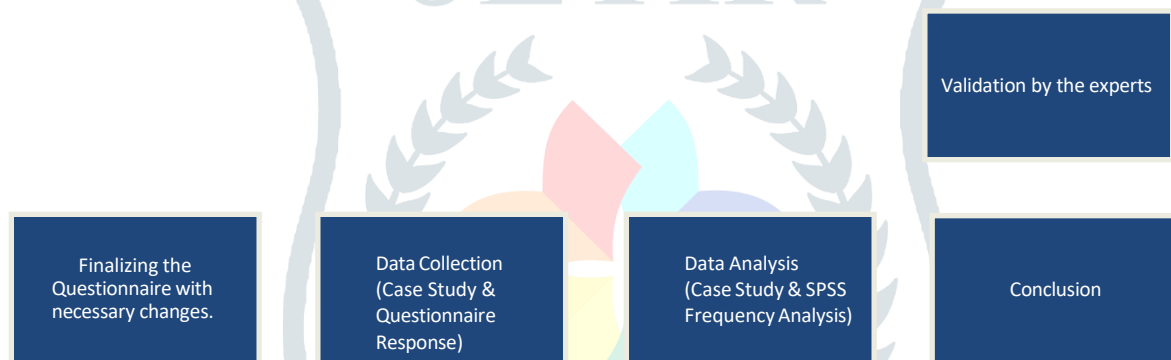


Fig. Research methodology

V. LITERATURE REVIEW

Improvement of checking for reduction of small-scale on construction site accident in Korea.

(Sejonge LIM, Am-raoh, 2018) Recently, the Korean government has focused on reducing building accidents. When comparing the TFR and AFR, it can be shown that occupational accidents occur more frequently than illnesses do to employees' fatalities in the construction business. The accident fatality rate (AFR) and total fatality rate were used to categorise the accident fatality (TFR). TFR accounts for deaths resulting from both occupational illnesses and work.

Earthing hazards on construction site:health and safety programme framework for small scale construction firms.

(Zakariyyah, k.L & Faremis, J.o., 2020) The purpose of this study was to evaluate different types of hazards, offer control strategies, and suggest a health and safety programme for local construction enterprises. Focus group discussions and formal interviews were used to do this. Risks related to using machinery for handling by hand, power, or mechanical means, such as cranes and excavators. Risks related with site movement, working at heights, and manual handling frequently lead to weariness, subpar delivery, and drug usage, in addition to physical damage or accidents. Repetitive movement and extended durations of vibrating tool use can also cause musculoskeletal diseases.

Analyzing Construction site Accidents in Kuwait

(Hashem m. Al-tabtabai, 2002) This paper suggest that accidents are attributed mainly to management practices rather than human or behavioral issues. The document includes recommendations for enhanced policy and management action and procedure implementation to increase construction site safety. Tool accidents, ladder falls, and scaffolding falls are the accident types that occur most frequently in Kuwait. The findings of this investigation and the WAD records concur that falls and tools continue to be the main causes of construction accidents in Kuwait.

Accident prevention model: case application in small-scale wood workshop of developing country

(Ozichukw OSAKWE, 2001) Fault trees were utilised to calculate the prior failure probability of each occupational safety barrier for the wood workshop inquiry (i.e. skin, bone, external organ, fatigue, and internal organ prevention barriers). The presented methodology is an effective preventive tool for identifying influential accident causative factors before an accident occurs. Non-linear programming method was used for data collection case study.

DATA COLLECTION

The collect Data to various sites including Residential and Commercial projects. In order to collect appropriate data and information for the study, various sources have been utilized. For the hypothetical background, literature study has been conducted, using both logical articles composed by experts in the field as well as books in the area of safety management. As well as collecting the information from several resources by filling form for each project, which contains the info factors and the actual expense of the project.

QUESTIONNAIRE DESIGN

- Questionnaire surveys were conducted to determine the judgments of various respondents in the construction industry.
 - Questionnaire results are used to improve the ability of all contractors to identify the most impaired and select appropriate mitigation strategies to manage risks and challenges during construction increase.
 - The survey form consists of the following two segments.
1. The purpose of the questionnaire is for research purposes only, which contains some information about the work of the project.
 2. Respondent details such as name, company name, Location, position, experience, etc.

SAMPLE SIZE

A sample is a selection of individuals or variables made for research purposes from a wider population. The sample should be representative of the population in order to guarantee that the results from it can be applied to the entire population.

- The sample size was determined using statistical calculations. We rank the project success elements using the Relative Importance Index (RII).
- To gauge the importance of various traits, the Relative Importance Index was used. The Relative Importance Index examines the variables influencing the security of construction sites.
- The five-point Likert scale, with 1 (Strongly Agree) was used. As result, the following formula was used to determine the relative importance index for the factor:

$$RII = \sum W / (A * N)$$

Whereas,

W= Weight give every factor the respondents (1 to 5);

A= the No of respondents.

N= totally number of respondents.

IDENTIFIED FACTORS

Sr. No.	Factors	Strongly Disagree	Disagree	Neutral	Agree	RII
1	Safety Budget					
2	Safety for labor					
3	No regular supervision at least once a week					
4	Management Commitment					
5	Workers are not likely to report incidents/ accidents					
6	Relationship between management and workers					
7	Occupational health and safety					
8	Lack of Training					
9	Insufficient knowledge of the workers					
10	Safety Policy Promotion					
11	No Safety Plan					
12	Effective enforcement Scheme					
13	Safety policy Program Evaluation					
14	Sufficient resource allocation					
15	Safety Management system					
16	Comprehensible policies					
17	Inadequate company policies					
18	Safety resource					
19	Lack of Knowledge of the work					
20	Poor safety awareness of top management					
21	Poor safety awareness of Project managers					
22	Poor condition of equipment / tools					
23	Safety Education					
24	Lack of Safety Awareness					
25	Management Support					
26	Personal Attitude					
27	Co - workers attitude					
28	To exhibiting of being tough guys					
29	Carrying out unsafe Practices					
30	Attitude of contractor's and labors safety					

Table.1 IDENTIFIED FACTORS

VI. DATA ANALYSIS AND DISCUSSION

There are survey collected information by Personally Contact with respondents. Respondents 69 fill is Survey form. Specific respondents in differs: Manager, supervisor, and contractor/Engineer. The years of experience and contribution in four categories with 1-5 year, from 6-10 years, from 11-20 years and 21 and more years.

RESULT OF RII METHOD

Sr. No.	Factors affecting construction site safety	ΣW	A	N	RII
1	Safety Budget	280	5	69	81.15
2	Safety for labor	277	5	69	79.71
3	No regular supervision at least once a week	330	5	69	95.65
4	Management Commitment	146	5	69	42.31
5	Workers are not likely to report incidents/ accidents	311	5	69	90.14
6	Relationship between management and workers	323	5	69	93.62
7	Occupational health and safety	269	5	69	77.97
8	Lack of Training	304	5	69	88.11
9	Insufficient knowledge of the workers	308	5	69	89.27
10	Safety Policy Promotion	275	5	69	79.17
11	Increase in number of safety sign	249	5	69	72.17
12	Actively report any incidents/accidents	285	5	69	82.60
13	Safety policy Program Evaluation	185	5	69	53.62
14	Irresponsible attitude of the workers during working or handling machines	196	5	69	56.81
15	Daily safety inspection by supervisor	295	5	69	85.50
16	Impose drug policy to be part of disciplinary policy	183	5	69	53.04
17	Inadequate company policies	177	5	69	51.30
18	Lack of accident records and official safety data	304	5	69	88.11
19	Lack of Knowledge of the work	340	5	69	98.55
20	Poor safety awareness of top management	323	5	69	93.62
21	Poor safety awareness of Project managers	318	5	69	92.17
22	Poor condition of equipment / tools	211	5	69	61.15
23	Safety Education	197	5	69	57.10
24	Lack of Safety Awareness	291	5	69	84.34
25	Proper & strict condition for PPE	269	5	69	77.97
26	Decrease Attitude for Labor	252	5	69	73.04
27	Safety signals, signs and Barricades	229	5	69	66.37
28	Equipment Acquisition and maintenance	235	5	69	68.11
29	Carrying out unsafe Practices	254	5	69	73.62
30	Attitude of contractor's and labors safety	328	5	69	95.07

Table:- 2 result of RII method

TOP TEN SUCCESS FACTORS AFFECTING CONSTRUCTION SITE SAFETY

Sr. No	Success Factor	$RII = \Sigma W / (A * N)$
1	Lack of Knowledge of the work	98.55
2	No regular supervision at least once a week	95.65
3	Attitude of contractor's and labors safety	95.07
4	Poor safety awareness of top management	93.62
5	Poor safety awareness of Project managers	92.17
6	Workers are not likely to report incidents/ accidents	90.14
7	Insufficient knowledge of the workers	89.27
8	Lack of Training	88.11
9	Daily safety inspection by supervisor	85.50
10	Lack of Safety awareness	84.34

Table:-3 success factor affecting construction site safety

VII. CONCLUSION

General Conclusion

There are various parts of the construction industry where safety is the most basic requirement for each project. Identify and evaluate the factors affecting construction site safety. The impact of survey factors affecting construction site safety was assessed by a review of respondents. The top factors determined by the study were (1) Lack of knowledge of the work, (2) Lack of regular supervision at least once per week, (3) Attitude of contractor's and labours' safety, (4) Poor management awareness of safety, (5) Poor awareness of safety project director, (6) Workers are unlikely to report incidents/accidents, (7) Insufficient knowledge of the workers, (8) Lack of training, (9) Daily safety inspection by supervisor, (9) Lack of safety awareness, and (10) Lack of safety awareness.

The main risks associated with task on building site are identified by direct observation. Risk is quantified using the values for likelihood and severity for the hazards found by the safety expert. A new safety performance model was created as quick and comprehensive assessment using questionnaires filled out by employees and managers who participated in site location Ahmedabad, sargasan and Gandhinagar. On the other hand, areas of falling accidents include temporary framework-72 deaths, stairs and ladder-27 and end part of structure-31 as well as collapse-17, electricity-15, fire and explosions-6, and fall of accidents-290 deaths.

VIII. RECOMMENDATIONS

The majority of the construction work at the sites studied did not have a professional safety and department. As a result, it is recommended that each site appoint a safety department to properly monitor construction site safety. An awareness campaign should be established to widen the understanding and requirements of construction site safety, as well as the importance of using in various construction activities to improve construction site safety performance. It is recommended to expand the organization of site safety inspections by utilizing experienced safety personnel.

It is recommended in the construction industry to train workers through weekly and monthly continuous preparation workshops for construction site safety. These workshops can help them improve their knowledge and become more environmentally conscious in terms of construction site safety.

IX. REFERENCES

1. ZAKARIYYAH, K. I., 2020. Earthing hazards on construction sites: health and safety programme framework for construction firms. The Lagos journal of Environmental, Vol.10, No.2
2. Hashen Al-Tabtabai, December, 2002. Analyzing construction site accident in Kuwait. Researchgate.net/ 228894298.
3. Sejong LIM, J., 2018. Improvement of inspection system for reduction of construction site accident in korea. Industrial Health 2018, 56, 466–474.
4. Ozichukwu OSAKWE, March, 2001. An accident prevention model: case application in a small-scale wood workshop of developing country. Asia-pacific Journal of science and technology volume 22. Issue:03
5. Carter, N., Menkel. E., 2003. Group routines for improvement accident prevention activities and accident statistics, international Journal of industrial Ergonomics 5, 125-132.
6. Yılmaz Fatih, February, 2015. Monitoring and analysis of construction site accidents by using accidents analysis management system in turkey. Researchgate.net/ 277655864
7. S. AJITH may 2021. An analytical investigation on improving safety performance in construction sites. Research and development, Kalasalingam academy of research and education, Krishnankoil-626126.
8. Fatih Yılmaz, December-2014, analysis of occupational accidents in construction sector in turkey. Journal of multidisciplinary engineering science and technology vol.1, Issue 5, ISSN: 3159-0040
9. Krishna Nirmalya Sen, November 2016. A study on accident prevention and control measures at construction works through implementation of engineering intervention programme. Publication/ UPES the national Builders University.
10. S. Kanchana, P. sivaprakash, 2015. Studies on labour safety in construction sites. The scientific world journal volume 2015, Article ID: 590810, 6 pages.
11. Dilip A Patel, Kumar Neeraj Jha, 2016. An estimate of fatal accidents in Indian construction. Researchgate.net/ publication/ 308155592.
12. Wael M. Alruqi, S., 2019. Critical Success Factors for Construction Safety: Review and Meta - Analysis of. Safety Leading Indicators. ASCE, pp. 1-11.
13. Jae-joonCHON, L., 2018. Improvement of inspection system for reduction of site accident in korea. Researchgate.net 222-245.