

An Analytical investigation on Improving Safety Performance in Construction Sites

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Abstract - Working Contention of Construction Sites are known to be unsafe due to complex errands, alter of work area, climatic conditions and brief organizational administration. The results of these risks may include word related illnesses, wounds and casualty. Wounds and mishap rates are tall in a development location when compared with other fabricating businesses. Security is one of the key variables in development destinations to relieve the seriousness of the chance. Evaluating the execution of the location concerning security is an imperative portion of the administration framework because it gives data on the security of the laborer as well as the errand. Thus the point of this investigate is to explore the location security execution and propose a methodology for enhancement. Usually worn out fundamentally four parts viz., quantification of chance included in each errand, bookkeeping for risky supervision, choice of right laborer for the correct errand and utilization of PPEs. Security execution cannot be measured as it were with the accidents/injuries within the location but the components which influence the impromptu occasions need to be highlighted whereas deciding the execution rate. In this paper we will take a review from past research about different analytical technique for measurement of safety performance on site and suggest the best analytical method.

Keywords - Construction Site, Safety . Analytical methods

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GENERAL

The security execution of the location is as a rule decided by wounds and mischances that happened within the location. Numerous analysts have centered on risky acts and risky conditions to decide security execution but it is an acknowledged truth that injuries/accidents may happen due to risky supervision Safety performance cannot be measured only with the accidents/injuries in the site but the factors which influence the unplanned events have to be highlighted while determining the performance rate. The factors include the task of the site (How risk the task is? High-risk task has higher severity rate whereas the low-risk task has lower or no severity and safer to work), unsafe or non-competent supervisors in the site, human error (both workers and the supervisors), workers performance, attitude and behavior of the worker in the site. supervision. Determining the safety performance of a site will assist to compare it with other sites and helps in improving the safety management systems

Selvam A, et.al (2019) The paper explores the various safety and control measures of accident in building projects to minimize accidents, occurrence and consequent waste generation. A research methodology, consisting of a literature review and field study were used to achieve the research objectives. The field survey involved a designed questionnaire that was administered through onvenience sampling techniques within lagos state and descriptive analysis tools were used for the analysis.

Zhenhua Luo (2019) In order to solve the problem of safety risk assessment in the construction of new subway station close-attached undercrossing the existing station, this paper considers the two objectives of ensuring the smooth operation of existing subway station and the safe construction of new subway station and uses DelphiMethod and EntropyWeightMethod to select the list of key risk factors from the list of preliminary risk factors. According to the list of key risk factors, the construction safety risk assessment index system is established. Based on the assessment index system, a construction safety risk assessment model is established by using AHP and FMEM. The assessment result of the model is basically in line with the actual situation through case analysis, which shows that the model has good practicability. In this paper, Delphi Method and Entropy Weight Method are used to select key risk factors, AHP and FMEM are applied to assess construction safety risk, and a new construction safety risk assessment model for subway crossing projects is proposed, which provides a theoretical basis for the construction safety risk assessment of new subway station close-attached undercrossing the existing operating station.

Chilamkuri Vasudha (2019) During the survey difference in management has been observed based on the size of the company and scale of operations. Big company like AMARAJA Infrastructure is implementing higher effective methods for Labour and Health & Safety through specifically designed programs like JSC and TBT

JSC provides information like PPE, Safety belts, Helmets, Protective glasses, Gloves, Hard Shoes. Irrespective of workers knowledge of safety, this program aims for daily routine on each individual for safety precautions especially PPE equipment. The talk cover the points like how to use each and every manual and electric tool properly which results in clarifying doubts and avoiding delays due to accidents during works.

Murat Gunduz , et.al (2018) The authors for this research taken a list of 40 safety attributes was produced and presented in a survey. The survey was distributed online and sent to various experts in the construction industry. 238 complete responses were received and analyzed by Frequency Adjusted Importance Index, Spearman's Rank Correlation, T-Test. As a result, "use of PPE (Personal Protective Equipment) and following safety rules and procedures," and "providing safety trainings, campaigns and awareness to employees by contractor, "were ranked as the most important safety attributes. The main contribution of this study can be summarized as ranking the safety attributes considering both their importance and frequencies as perceived by various groups of industry professionals and identification of influential attributes affecting construction safety which have significant level of agreement among various groups in the construction industry

Ophir Rozenfeld a et.al (2018) Job Safety Analysis (JSA), which is also known as Job Hazard Analysis, is an efficient proactive measure for safety risk assessment used in industrial manufacturing settings. However, unlike the manufacturing settings for which JSA was developed, at construction sites the physical environment is constantly changing, workers move through the site in the course of their work, and they are often endangered by activities performed by other teams. To address this difficulty, a structured method for hazard analysis and assessment for construction activities, called "Construction Job Safety Analysis" (CJSA), was developed.

K Mohammed (2018) hierarchical framework is developed to illustrate how the extracted factors influence safety on construction projects. The proposed framework is validated by using interviews with experts. The hierarchical framework explicitly confirms that safety performance not only is determined by management activities within project levels, but also by the interactions among factors at different hierarchical levels.

Murat Gundua, et.al (2017) This paper focused on the formulation of the safety performance index of construction sites based on validated multidimensional safety performance model. A safety performance index assessment tool was proposed by developing a site safety performance application for mobile devices. PhoneGap was selected to develop a hybrid mobile application. A brief explanation of the development procedure of the site safety performance (SSP)

application for mobile devices by PhoneGap was made. Snapshots of the pages of SSP application for mobile devices were demonstrated. This application would work with any construction type. This tool can be used at any stage of the construction. The enduser is to decide the required level of percentage index calculated by the model. The output of the study was validated with 11 international construction projects as case studies

Abel Pinto a,† , et.al (2017) This paper presents a state-of-the-art on ORA traditional methods, for the construction industry, discussing their limitations and pointing advantages of using fuzzy sets approaches to deal with ill-defined situations.

Mohd. Aqleem Mir(2017) The construction industry is considered as one of the most hazardous industrial sectors wherein the construction workers more prone to accidents. Despite recent efforts to improve site safety, construction still accounts for a disproportionate number of occupational related fatalities. In developed countries there is strict legal enforcement of safety in the construction industry and also in the implementation of safety management systems which are designed to minimize or eliminate accidents at work places. However, occupational safety in construction industry is very poor in developing countries because lack of safety regulations and standards, low priority of safety, lack of data on safety at construction sites, lack of safety training, lack of safety promotion, and lack of documented and organized safety management systems.

Ahmed Senouci (2015) Author finds that 1) identify the major safety risk factors in Qatari building construction sites and 2) apply risk management technique to assess the impact of these risk factors. A questionnaire was designed based on a comprehensive literature review and feedback from safety engineers working in the Qatari construction industry. The questionnaires were distributed among practitioners with varied positions, duties, and work experiences to collect different opinions and views. The questionnaire included three main parts. The first part included general questions about the respondents' background. The second part addressed the extent of risk management application in Qatari construction projects and the major benefits of risk management.

Imthathullah khan, et.al (2015):The paper presents a study in construction industry to improve the safety performance. The main objective of this study is to identify the critical success factors which are responsible for the implementation of safety management in construction projects. This study was carried out by conducting questionnaire survey among the contractors and clients of various construction projects, for testing their experience in safety management system. Questionnaire survey was analysed using SPSS software. The results of

the study revealed that there are many safety problems in the construction industry, such as lack of knowledge about the necessity of earth connection for power tools and lack of knowledge about cables protect from mechanical damages. Furthermore, the study also proposes some recommendations for safety in construction industry. reveals different controls measures in place and their rate of usage on building projects.

S. Kanchana et.al (2015): Construction industry has accomplished extensive growth worldwide particularly in past few decades. For a construction project to be successful, safety of the structure as well as that of the personnel is of most importance. The safety issues are to be considered right from the design stage till the completion and handling over of the structure. Construction industry employs skilled and unskilled labourers subject to construction site accidents and health risks.. This paper presents the result of questionnaire survey, which was distributed among various categories of construction workers. This paper examines and discusses in detail the total working hours, work shift, nativity of the workers, number of accidents, and type of injuries taking place in small and large construction sites.

Nadeera Abdul Razak (2014): Cases of construction site accidents always happen. In line with the efforts to reduce accidents at construction sites in Malaysia, the objective of research are to determine the current safety practice at construction sites, to identify the safety practices related problems, and to identify the strategies to reduce the safety practices related problems. Two case studies were conducted for data collection. Data were collected through semi-structured interviews with safety officers of respective project. It is concluded from the research findings that generally the construction sites has good and structured as far as safety practices are concerned. Among the practices are safety policy, education and training, site safety inspections, safety auditing, safety meeting, site safety organizations, personal protective equipment, emergency support and safety measuring devices, fall protective systems, and safety promotions. present study will help out in ascertaining the proper safety Planning in building construction.

J. W. Garrett1 et.al (2009) In this paper authors proposed a new error analysis, educational, and classification tool for safety within the construction industry. The intent of this research study was to develop an intuitive field program regarding human error that educates executive, operations, and field employees in the identification of human error causation and the techniques of mitigation. Many reasons of unsafe behavior were discussed. An outlook was presented to validate the presented framework through data collection and data analysis to develop effective training and active safety tools

David E. Cantor (2008): The purpose of this paper was to review the literature and call for additional research into the human, operational, and regulatory issues that contribute to workplace safety in the supply chain. This paper identifies several potential research opportunities that can increase awareness of the importance of improving a firms workplace safety practices. This paper identifies 108 articles which informs, how the logistics and transportation safety has evolved. The paper identifies 14 future research opportunities within the workplace safety in the supply chain, that have been identified can have a positive effect on practitioners confronted with safety issues.

Todd W. Loushine et.al (2006): Abstract from a theoretical standpoint, quality management and safety management programs have similar characteristics. In construction work, a company ability to deliver a quality product in a safe manner is the key to business success. In order to better understand what contributes to successful quality and safety programs in construction, a literature review was conducted using general, engineering and business literature search engines. In all, 49 articles were found: 18 articles on safety, 26 articles on quality, and five articles on safety and quality. Overall, the literature supports the use of integrated safety and quality management in construction. However, according to the literature, there are three primary barriers to the success of quality management in construction projects.

SUMMARY

The risk is quantified for every task in the construction site using Hazard Identification and Risk Assessment (HIRA) technique. As HIRA is a generic method for quantifying risk in all types of workplaces, this method is adopted to classify and prioritize the risk zone. The purpose of risk assessment is to identify all the factors that may cause harm to employees and others (the hazards) and consider what are the chances that harm and the possible severity that could come from it (the risks) . The person who is performing risk assessment should be familiar with all the tasks in the construction site, must have in-depth knowledge of the likelihood and severity of the hazards

CONCLUSION

Development industry is considered as the back bone of the nation. Its commitment within the improvement of the nation is exceptionally vital, since it is the moment biggest division utilizing the specialists another to the rural division, but in case of accident it is the primary division following to the street mishaps. This does not result as it were in misfortune of life and property and moderate down of the work, but moreover make a feeling of fearness among its administrators (management, supervisors, specialists, etc). Security

Administration in this manner plays an awfully imperative part in development industry. HIRA methods can be a best reasonable for Examination on moving forward execution on development destination

REFERENCES

1. M. Gunduz, M.T. Birgonul and M. Ozdemir, Development of a safety performance index assessment tool by using a fuzzy structural equation model for construction sites, *Automation in Construction*, 85 (2018), 124-134.
2. O. Rozenfeld, R. Sacks, Y. Rosenfeld and H. Baum, Construction jobsafety analysis, *Safety science*, 48 (4) (2010), 491-498.
3. IWH. Fung, VWY. Vivian, TY. Lo, and LLH. Lu, Developing a riskassessment model for construction safety, *International Journal of Project Management*, 28 (6) (2010), 593- 600.
4. C.F. Chi, C.C. Yang and Z.L Chen. In-depth accident analysis of electrical fatalities in the construction industry, *International Journal of Industrial Ergonomics*, 39 (4) (2009), 635- 644.
5. T. Aksorn and B.H.W. Hadikusumo, Critical success factors influencing safety program performance in Thai construction projects, *Safety Science*, 46 (4) (2008), 709-727.
6. M. Gunduz and B Ahsan, Construction safety factors assessment through frequency adjusted importance index, *International Journal of Industrial Ergonomics*, 64 (2018), 155-162.
7. A. Pinto, I.L. Nunes and R.A. Ribeiro, Occupational risk assessment in construction industry–Overview and reflection, *Safety Science*, 49 (5) (2011), 616-624.
8. J.W. Garrett and J. Teizer, Human factors analysis classification system relating to human error awareness taxonomy in construction safety, *Journal of Construction Engineering and Management*, 135 (8) (2009), 754-763.
9. T. Vondráčková, V. Voštová, and V. Nývlt, The human factor as a cause of failures in building structures, *MATEC Web of Conferences*, 93 (2017), Article no. 03005
10. K. suguna and P.N. Raghunath (2015) A Study Of Safety Management In Construction projects
11. Mohd.Aqleem Mir,Bibha Mahto (2015) Site Safety And Planning For Building Construction
12. Krithika Priyadarshini (2010) Safety Management And Hazards Control Measures In Construction
13. S. Kanchana and Sebastian Joseph (2015) Studies On Labour Safety In Construction Sites
14. Todd W. Loushine & Michael J. Smith (2006) Quality And Safety Management In Construction
15. Nadeera Abdul Razak (2014) Case Study Of Safety Management At Construction Site An Analytical investigation on Improving Safety Performance in Construction Sites JSPM's ICOER Wagholi Page 2
16. Irshadhusen Shekh (2015) A Study On Health And Safety Measures: A Study Of Selected Employees In Innovative Cuisine Private Limited
17. Reese, Charles D.; Eidson, James Vernon (2006). *Handbook of OSHA Construction Safety and Health*
18. Helen Lingard, Steve Rowlinson (1999) *Occupational Health and Safety in Construction Project Management*
19. Liu, G.W. (2007) *Innovate Safety Management to Build Safe and Harmonious Enterprise. City High-Speed Rail Transit*,
20. 20, 34-40. 20. Chapman, R.J. (2001) *The Controlling Influences on Effective Risk Identification and Assessment for Construction Design Management. International Journal of Project management*, 19, 147-16
21. FHA (1999) *Asset Management Primer. Office of Asset Management, U.S. Department of Transportation, Federal Highway Administration.*
22. Liu, G.W. (2011) *The Research and Application of GMC Safety Alarm and Emergency Platform. Modern City Rail Transit*, 18-21

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