The Effectiveness of Health & Safety Training and its Impact on Construction Workers' Attitudes in Sri Lanka

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Abstract*: Construction accidents happen due to defects on site environment or else defects on health and safety system. In the recent years, Sri Lankan construction industry experienced a considerable number of fatal and non-fatal accidents. Occupational health and safety training can apply as a precautionary action to reduce work site accidents. The construction workers attitude towards health and safety training is essential to make it more practical. The main objective of the study was to study the effect of occupational health and safety trainings and its impact on worker health and safety attitudes. Both qualitative and quantitative methods were applied to achieve the objectives. The data collected through questionnaires which was consist with closed-ended questions and five Likert scale questions and the semi-structured interviews. The degree of application on health and safety training was analysed through frequency analysis. Further, the relationship between health and safety training and workers attitude and the barriers on implementing health and safety training were analysed through correlation and regression analysis. Finally, the solutions to reduce work site accidents were analysed through content analysis. According to these analysis, results proved that there is a positive relationship between health and safety training and construction workers attitude in Sri Lanka. Conduct high-engaging health and safety trainings, conduct health and safety meetings and inspections, rewards and appreciations and managerial support were the results of the interviews to enhance the workers attitude on safety.*

Keywords: *Health & Safety Training, Construction worker, Attitude, Sri Lanka*

1. Introduction

Construction industry play a major role in today's world and it gives a biggest support to the economy of each and every country (Ofori, 2015). Construction is not only considered to be one among the foremost major industries in terms of its contribution to economic process (Alberto *et al.*, 2017). Therefore, before conducting a construction project we have to think of many areas like cost, time duration, capacity, environment, labour force, staff, safety etc. Among them, 'safety' or else 'the state which not being threatened by destruction or other undesirable consequences' is one of the main key area we should concern in a construction project (Risath, Sivatharsan and Thishanth, 2017). Sri Lanka is still in under developing country category where so many construction activities undergo and faced similar nature accidents can be happened. Fatal accidents and non-fatal accidents are main two types of construction accidents. Those accidents can be happen through fall from heights, struck-by or struck-against objects, when lifting and carrying, during machinery works, electrocution, elevator accidents, fire and explosion (Halwatura, 2012; Perera, Somachandra and Samarasiri, 2017).

In recent years Sri Lankan construction industry reported a larger number of fatalities and injury rate, which was ranked as the 3rd worst sector among other industries in Sri Lanka (Halwatura, 2012). Therefore the need of safety is really matters since it creates no obstacles in work. However, construction

accidents result in the loss of 500,000 man-days in each year which make a huge loss of productivity and other related matters (Dasandara and Dissanayake, 2021). Workers attitude on health and safety training can affect positively to reduce the worksite accidents. Main objective of this study is to study the effect of occupational health and safety training and its impact on worker health and safety attitudes. Furthermore, the main objective achieved through following sub-objectives;

[1] To identify the relationship between the occupational health and safety trainings and its influence on construction workers attitude

[2] To identify the issues regarding the implementing proper Health and Safety trainings

[3] To identify the practical solutions to reduce the work site accidents in Sri Lanka.

The construction workers, contractors, project manager and the client were the benefited parties in this research. Through this research, the construction industry will gain so many benefits like; invention of more techniques which can be applied for the Health and Safety training, it will increase the construction workers attitudes, it will help to deliver the project at correct time without any delay and it will help to decrease the cost which account due to the defects of the Health and Safety system.

2. Literature Review

A. Occupational Accidents

The worksite accidents are mostly happened due to immense use of sub-contractors, inaccurate record keeping of accidents, competitive tendering, less priority given for training and poor safety training etc. (Choi, Chan and Chan, 2012). That emphasis, poor safety training badly affect for the rate of construction accidents. The research study showed that when consider the years from 2004 to 2010, large number of fatal and non-fatal worksite accidents are happened from the unskilled labours in Sri Lanka (Halwatura, 2012). It indicates that the increase of occupational accidents can be seen in Sri Lanka as well.

B. Occupational Health and Safety Trainings

The systematic learning and the improvement of knowledge, skills and attitudes which required for the workers to perform competently and enhance performance in the job is defined as 'Training' (Clarke and Flitcroft, 2013; Mushayi, Deacon and Smallwood, 2018). That implies how much training is important for the workers which automatically improve the Knowledge, Skill and Attitudes and the performance.

Mainly there are two types of safety training that can be seen in the construction industry namely high engagement training and low engagement training (Robson *et al.*, 2012). Further it defines that lecture or information or video based methods were called low engagement trainings where simulation, behavioural modelling and hands on trainings were define as high engaging trainings. There is positive relationship between the safety risk awareness and highly engaged training (Namian *et al.*, 2016). Further it says, high engagement training gives a high level of safety risk awareness.

C. Hazard Identification

There are few steps need to be followed in safety management process, among them the very first step is hazard recognition (Namian *et al.*, 2016). Up to 42% of work site accidents are happened due to lack of hazard identification and assessment performance (Jeelani, 2016). There are several techniques and training programs to enhance the hazard identification by reducing occupational accidents (Jeelani, 2016; Namian *et al.*, 2016). Fall from heights, electrocution and exposure to harmful stuffs are the most reported hazards in Sri Lanka (Vitharana, Silva and Silva, 2015). According to a survey, it indicates that even minimum training is enough to identify the hazards and also it implies that thorough Occupational Health and Safety training is a must for hazard recognition since it influence the behaviour of the workers to adjust as per the situation arise (Perlman, Sacks and Barak, 2014).

D. Health and Safety Culture and Climate

A clear set of perception and expectations that construction workers have on safety in the organization is defined as safety climate (Risath, Sivatharsan and Thishanth, 2017)). Safety culture was expressed in safety attitudes, awareness and in safety behaviour (Clarke and Flitcroft, 2013). That implies in safety culture also can be seen in the workers safety attitudes also One of the main reason for the enhancement of safety culture in the organization and deduction of fatal and non-fatal accidents is due to involvement of the Occupational Health and Safety Training (Bahn and Barratt, 2014).

E. Health and Safety Signs and Symbols

Symbols and signs are specifically used for the purpose of improving Occupational Health and Safety Training awareness in construction sites (Mushayi, Deacon and Smallwood, 2018). Safety signs and symbols are defined as a method of providing information and also alerting the construction workers about the possible hazards that can be exposed in the work site (Amirhossein *et al.*, 2015). That illustrates Health and Safety signs and symbols help to improve the knowledge on workers regarding hazards and it is a better mechanism to communicate information without words. The signs and symbols which are designed graphically and colourfully along with naming those boards with all the three languages (Sinhala, Tamil and English), help to attract the attention of the construction workers and improve the safety attitude of them. According to this statement it simply shows that there is a positive relationship between Health and Safety signs and symbols and workers attitude.

F. Health and Safety Inspections

Health and Safety inspections plus actions were also important in Occupational Health and Safety related issues (Mushayi, Deacon and Smallwood, 2018). Furthermore states that, the Health and Safety inspections which are done as per a routine have a positive impact on occupational Health and Safety Training practices. It illustrates that there is a link between Health and Safety inspections and with the workers attitude. Previous study states that, safety experts believed that occupational accidents were can prevent through physical paths like fencing machinery and piloting Health and Safety inspections (Ghofranipour *et al.*, 2009).

G. Construction Workers' Attitude

The attitude and the behaviour of the construction workers is a huge element in jobsite safety, since most of the fatal and non-fatal accidents happen due to anxious actions they taken at the sites (Widaningsih, Susanti and Chandra, 2018). It concludes that the both positive and negative impact is solely depend upon the workers attitude. Construction workers' attitude is one of the main factor which is important in the construction sites (Othman, Shafiq and Nuruddin, 2018).

H. Barriers to Implement Health and Safety Training

Lack of managerial support is one of the significant barrier to implement health and safety measures after the Occupational Health and Safety Training has been conducted (Weinstock and Slatin, 2012; Dasandara and Dissanayake, 2021). This statement concludes that there are some more reasons where it directs to lack of managerial support. The language barrier was seen in Sri Lankan construction industry since the most of the construction workers have less education level which was not sufficient to understand Occupational Health and Safety Training and as a result they are reluctant to learn Health and Safety measures (Halwatura, 2012).

A previous research found that the workers were tend to work at an any risky situations due to low income level in Sri Lanka (Dasandara and Dissanayake, 2021). Furthermore it described that, when looking at the workers' income levels in both instances, these workers earn low amount and live in low- income households with many dependents where faced numerous financial difficulties in daily lives and automatically driven them to work at any risks to earn more and more money.

3. Methodology

The target of this study is to identify the effectiveness of health and safety training and the way of it is impact on workers attitude in the Sri Lankan construction industry. There are two types of variable can be seen in this research known as dependent variable and independent variables as shown in the Figure 1, Conceptual framework.

A. Conceptual Framework

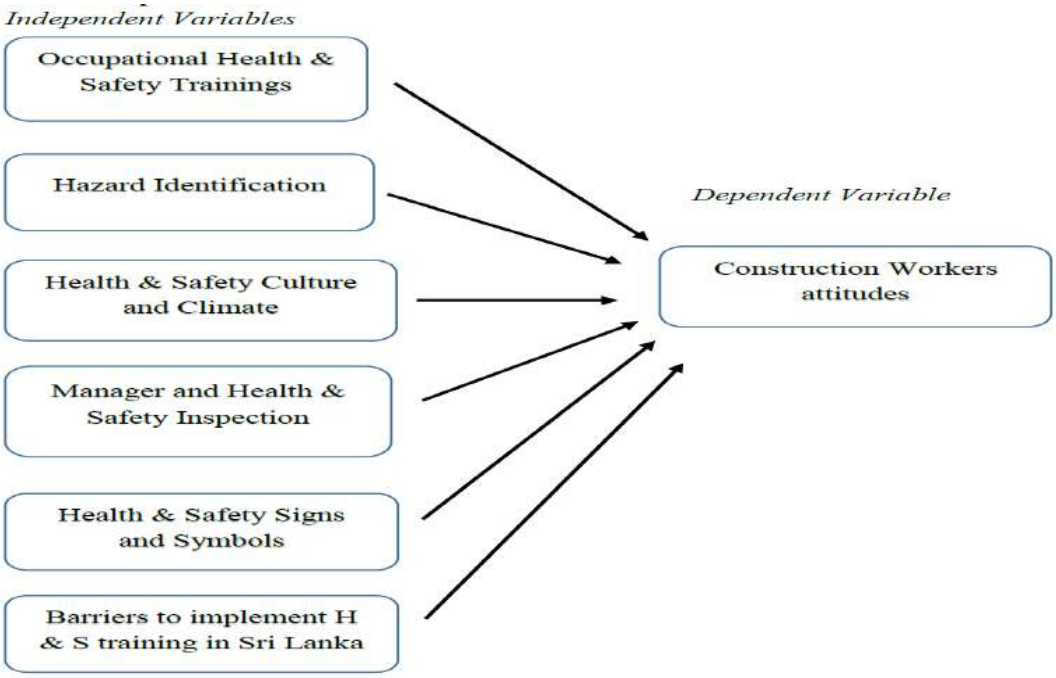

Figure 1: Conceptual Framework

B. Hypothesis

H_{A0} - There is a relationship between Occupational Accidents and the Construction workers attitudes

H_{A1} - There is no relationship between Occupational Accidents and the Construction workers attitudes

H_{B0} - There is a relationship between Occupational Health and Safety Trainings and the Construction workers attitudes

H_{B1} - There is no relationship between Occupational Health and Safety Trainings and the Construction workers attitudes

H_{C0} - There is a relationship between Hazard Identification and the Construction workers attitudes

H_{C1}- There is no relationship between Hazard Identification and the Construction workers attitudes

H_{D0} - There is a relationship between Health and Safety Culture and Climate and the Construction workers attitudes

H_{D1} - There is no relationship between Health and Safety Culture and Climate and the Construction workers attitudes

H_{E0}- There is a relationship between Health and Safety Signs and Symbols and the Construction workers attitudes

H_{E1} - There is no relationship between Health and Safety Signs and Symbols and the Construction workers attitudes

H_{F0} - There is a relationship between Health and Safety Inspection and the Construction workers attitudes

H_{F1} - There is no relationship between Health and Safety Inspection and the Construction workers attitudes

H_{G0} -There is a relationship between Barriers to implement Health and safety trainings and the Construction workers attitudes

H_{G1}-There is no relationship between Barriers to implement Health and safety trainings and the Construction workers attitudes

C. Data Collection

Data collection is important to obtain the final outcome of the research properly. There are two types of data collection methods as namely; primary data collection and secondary data collection method. Both the methods were applied for the research, primary data collection method was used since there were objectives need to be fulfilled through semi structured interviews and also the data which were found already by another researchers' also used for this research which means secondary data collection. The sample was taken only from the Colombo District since most of the development projects in different levels are mostly located in that district. Around five ongoing constructions projects were selected for the data collection task which were having different grades in construction that may help to collect data from different levels of construction workers.

In analysing the data, correlation analysis method was used to identify whether there is relationship between the safety trainings and the construction workers attitude. Regression analysis and the relative important index method was applied to identify the issues regarding the implementing proper Health and Safety trainings since the impact of each variable was essential. Lastly, content analysis was applied to analysis the data taken from the semi structured interviews.

D. Reliability of the Questionnaire

Reliability test used for the questionnaires which are validated using Cronbach alpha coefficient measure before the project objectives could be assessed (Clarke and Flitcroft, 2013). Further it says that the accuracy and the reliability is increased when the Cronbach's Alpha coefficient of reliability is closer to one. But there is a cut-off point. That is 0.7. The result should be more than 0.7 to make the result more realistic. The overall reliability of the questionnaire was resulted as 0.976.

Table 1: Correlation Results

Variable	Pearson Value
Occupational accidents	0.910
Hazard identification	0.876
Health and Safety culture and climate	0.873
Health and Safety inspections	0.934
Health and Safety signs and symbols	0.883
Barriers to implement Occupational Health and Safety training in Sri Lanka	0.922

4. Results

A. The relationship between the occupational health and safety trainings and construction workers attitude

The correlation analysis was used to figure out the result of relationship between occupational health and safety training and construction workers attitude. The coefficient value was 0.864 where it means have a positive correlation between the dependent and independent variables. The remaining all the independent variables (occupational accidents, hazard identification, Health and Safety culture and climate, Health and Safety inspections,

Health and Safety signs and symbols and barriers to implement.)

B. Barriers to implement Occupational Health and Safety training in Sri Lanka

The Regression Analysis and Relative Important Index were used to figure out the barriers to implement occupational health and safety in Sri Lanka. The overall regression was resulted as 0.977 while barriers to implement occupational health and safety in Sri Lanka showed as 0.273. It concluded that there was an impact on construction workers attitude through this independent variable and the significance value was 0.002 which proved that it statistically significant.

According to the Relative Important Index value, the average amount was 0.720 and it was ranked in 3rd place. The result prove that all the three barriers namely, 'Lack of managerial support', 'Language barrier' and 'Risk taking behaviour' were relatively important and it affect on construction workers attitude.

C. Solutions to reduce work site accidents through enhancing workers attitude

Occupational accidents are one of the major factor that should be mitigated as much as possible. Therefore, taking precautionary actions is highly appreciated in such occasions. Since the research study is targeted Occupational Health and Safety training and the workers attitude, therefore project manager and safety officer were the people who targeted for the interviews. The age range facing accidents mostly and the reason, the current safety practices conducted to reduce occupational accidents, opinion of investing money for safety training and solutions to reduce work site accidents were the key areas focused under semi structured interviews.

The age range facing construction related accidents mostly and the reason

The interview results shows that mainly the age below 18 and age between 18– 25 have high frequency on facing construction site accidents. For an example, the safety officer from project A said that, "every day we conduct safety meetings at the site and instruct how to work safely at site but unfortunately most of the young generation age below 25, do not adhere and follow the safety guidance properly."

Table 2: Project Details

Project Name	Grade of the Contractor	Project duration	Location
A	CS1	17 months	Colombo 03
B	C1	18 months	Colombo 08
C	CS2	21 months	Colombo 02
D	C7	12 months	Colombo 03
E	C1	16 months	Colombo 03

Another opinion was point out by a project manager from project C told that, "the young generation mostly prefer to participate for risky works and unfortunately face severe accidents." It concludes that the risk taking behaviour can be seen in the younger generation when compared it with elderly labours.

When considering above research findings, almost all the interviews concludes that the younger generation face accidents when compared to the older generation and as for the reasons; thought of young energetic power, risk taking behaviour and poverty.

The current safety practices conducted to reduce occupational accidents

This was the second point which asked in the interview from the respondents. Since safety practices improve the degree of safety by

reducing accidents that can happened at the construction sites.

One of the safety officer from Project D said that "our company conduct safety inspections and meetings in daily basis, conducting training programs and confirm the site safety always." This opinion was come up with all the five projects as the main safety practices they follow up at the site. The project manager from Project E told that, "Conducting safety meetings, safety inspections, providing Personal Protective Equipments, use of safety signs and symbols and site clean are the safety practices conduct in our project." Apart from the other opinions, this respondent expand the idea by adding some more safety practices like use of safety signs and symbols and keep the site clean.

When considering above research findings, almost all the interviews mainly point out some safety practices like safety inspections and meetings, use of safety signs and symbols, use of Personal Protective Equipment and keeping the site clean may help to reduce occupational accidents.

Opinion on investing money for safety training

Safety training cannot be done easily, it spent both time and money. Therefore, allocating money for a training program should a deep concern since a construction project strictly concern on budget.

The safety officer from project C mentioned that, "that is the best solution to reduce work site accidents is proper safety training program, therefore investing money for such thing benefited in long term." Where the almost same idea was provided by other respondents. But the Project manager from project D said that, "investing money on safety training is a waste of money since most of the labours did not follow the guidance provided by the safety training properly." It illustrates that there are people whom with different perspectives not seen the positive side of the safety training.

When considering above research findings, it concludes that investing money on safety training was not a waste and it is a huge invest for the future since it reduces the occupational accidents and save that money.

Solutions to reduce construction work site accidents in Sri Lanka

Whereas solutions on reducing the occupational accidents in construction was very practical on nowadays, that was the last question asked at the interview. The participants gave different answers as per their perspective. The safety officers from project A, C and E stated that, "giving rewards for the labours who work safely, providing induction training, providing proper Personal Protective Equipment, establishing safety sign and symbols and conducting safety meetings in daily basis are the solutions to reduce work site accidents." Apart from these suggestions the project manager from project D said that, "introducing proper safety guideline by the government and inspect the project by the government officers and also increase the level of education the labours can enter into the industry will help to reduce the construction occupational accidents in Sri Lanka."

However, all the opinions and suggestions mentioned in the above may help to reduce the accidents in Sri Lanka at a considerable level.

5. Discussion & Conclusion

As discussed briefly in previous sections it concluded that construction industry greatly affect for the economic development of the country. The research study determined that a suitable and proper Health and Safety training is essential to achieve the required knowledge and skills to carry out a task. Further, Health and Safety training helps to transfer the knowledge to reduce occupational accidents, identify the hazards and change the workers attitude. Therefore, health and safety training ought to be beneficial in transforming construction employees' beliefs and attitudes, and as a result, the way they act safely at work.

The research study determined that a suitable and proper safety training is essential to achieve the required knowledge related to carry out a task safely.

The research study concludes that language barrier, lack of managerial support and risk taking behaviour affect on construction

employees' attitudes regarding implementation of safety training. Mitigating those barriers is essential. Therefore as solutions the research study identified some precautions through conducting semi structured interviews, providing proper Personal Protective Equipment's, establishing safety sign and symbols and conducting safety meetings in daily basis, introducing proper safety guideline by the government and inspect the project by the government officers and also increase the level of education the labours. These measures would assist to reduce occupational accidents.
According to the research findings providing well-structured and high engaging training for the construction employees' periodically, correctly expressing their values recruiting only the new employees' who can adopt and adhere to those values, awarding some rewards and appreciations to the employees' who work safely at site, conducting Health and Safety inspections and meetings on daily basis and displaying safety signs and symbols which are fully readable are the recommendations to enhance the construction workers attitude.

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