The solutions for improving safety performance in construction industry of Iran and productivity of projects

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**ABSTRACT**

Safety is among the main concerns of Iranian construction managers and activists. So, considering the issue of safety in construction industry and research is necessary. In this project it is tried to identify and analyze the most important effective factors on safety performance of construction projects in Iran. A questionnaire was distributed among the experts and Cronbach alpha reliability was used to consider its reliability and correlation and other analyses on the data showed that personal capabilities, proper safety training and personal belief and attitude to safety were the most important factors.

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**INTRODUCTION**

Construction industry is a key industry in most of the countries which is of great importance both in providing employment and economic output. Also, this industry is facing with lots of safety problems and the health of those working in it. This issue is one of the main concerns of Iranian construction managers and stakeholders. Based on statistics and documents, construction industry has the highest accidents and incidents among the industries. Also, the highest rate of injuries and damages belong to this industry.

**Definition of safety**

Safety is defined as:
1- Being protected and safe. The health of all workers and others who are related to construction operations in work environment.
2- Being protected and safe. The health of all who live, pass or act near the construction site.
3- Protecting and saving the buildings, cars, establishments and etc. inside or near construction site.
4- Protecting environment inside or near the construction site.

Nearly 40% of all job accidents of Japan belongs to construction industry, 40% in Ireland and 25% in Britain.

**Methodology:**

Due to the lack of the needed rules and regulations or the lack of executive power or enough ability, the status of safety is more undesirable in developing countries. Considering he construction status of Iran, it can be understood that in spite of the made efforts and legislation of different rules, the condition of safety is not so desirable; so that, the lack of observing safety points can be seen even by unfamiliar people with construction industry. The present study presents the effective factors on safety performance in Iran and solutions to improve them through a survey research.

Safety is a very wide issue in construction industry and lots of studies have been devoted to its different aspects.
Regarding more than 39 papers, it was specified that literature review on construction industry has considered 14 areas including:
- Investigation of safety concept and the dependent concepts;
- Investigation of different approaches and different aspects of safety and its management;
- Stemming the accidents and identification of hazards;
- Analyzing the efficiency rate and effectiveness of safety management systems and the ways to improve them;
- Investigation of employed people in construction industry;
- Prioritization, determination of goals and executive indices in safety management;
- Designing and presenting a framework and how to manage it;
- Effective factors on safety.

Different papers have presented numerous effective factors on safety performance in different countries which have many similarities in spite of their differences.

Considering the papers and consulting with experts, the cases to be searched were specified. Totally, 17 factors were identified as effective factors on safety divided in four categories:
- First group: the factors related to the arrival of the staff in safety issue.
  - Positive group norms
  - Personal belief and attitude to safety
  - Personal motivation
  - Continuous participation of the staff
  - Safety sessions.
- Second group: the factors related to prevention and controlling systems
  - Effective executive systems
  - Proper supervision
  - Supplying and protecting equipment
  - Proper safety training
  - Personal capabilities
  - Program assessment.
- Third group: the factors related to safety arrangements
  - Management support
  - Team work
  - Clear, logical and realistic goals

These factors were changed to a questionnaire distributed among the experts. The present study used survey-descriptive method to collect the data on experts’ opinions. Regarding that safety issue is related directly or indirectly with all active individuals in construction industry, all stakeholders of this industry are the population of this study. Random sampling was used to determine the study sample. It should be noted that it
was tried to include enough samples with adequate experience and skills in safety issues. McKlie et al (2008) method was used to determine the sample size. Based on this method, the minimum of sample should be 68; where, \( m \) is sample size, \( z \) is statistical significance, \( p \) is the value of population ratio which is estimated and \( \varepsilon \) is sampling error at estimation point.

\[
    m = \frac{z^2 \cdot p \cdot (1-p)}{\varepsilon^2} = \frac{(1.645)^2 \cdot 0.5 \cdot (1-0.5)}{0.1^2} \approx 68
\]

The questionnaire included three sections and a demographic information part. For every factor two questions were considered where the first question was on the importance of each of factors and the second question was on the attention rate to the factor in construction industry.

Cronbach alpha reliability was used to consider the reliability of the questionnaire. Internal validity of the questionnaire was tested by correlation among the items and relative importance coefficient was used to calculate the relative importance of every factor. SPSS was used for data analysis.

Among 95 distributed questionnaire, 69 were completed which shows 72% participation.

Participants’ education (Senior diploma, bachelor, master, PhD) Cronbach alpha level was more than 0.8 for all groups showing high level of reliability. Cronbach alpha for all 17 factors came 0.964.

Correlation among the factors was also considered showing proper values.

The following table shows the comparative importance of effective factors in different groups.

**Comparative importance of the 17 factors:**

Based on the results, it can be said that attention to these factors is very low. In 13 out of 17 factors, most of the participants (More than 50%) selected “Low” regarding observing the factors in construction industry. Also, for none of the factors, “High” was not selected more than 12% which shows a hazard for construction industry of Iran.

Observing the safety proper training (high, mid, low).
Observing personal belief and attitude (high, mid, low).

Observing personal capability.

**Conclusion:**

The results of the study were compared with the studies in different countries. The results had some differences and similarities with previous research. Since the studies have been done in different countries and construction industry of Iran can have significant differences with them, the same results are not expected. Also, the results of the previous studies are different and it is not realistic to expect the similarity of two survey researches.

It seems that the results of the present study focus more on personal issues including their ability and attitude to safety issue and its training. It can be caused by cultural attitude of Iranians to individualism and the lack of attention to the role of management and team work which can be observed in most of the cultural areas. Considering the effective factors on safety conditions in construction industry, paying attention and investing for promotion and application of each of prioritized factors is of great importance.

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