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Mechanism of Implementation International standards for Professional Quality in Construction Companies in Khartoum state

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Abstract

Construction industry Organizations are implementing a number of management systems such as Health, Safety, Environmental and Quality (HSEQ) management systems that knows as " international standards " such as OHSAS 18001 for health and safety management system, ISO 14001 for environmental management system, and ISO 9001 for Quality Management System, these management systems are often

Treated as independent functions or/ and integrated as HSEQ within construction industry organizations. The aim of this paper was evaluating the mechanism of implementation the HSEQ international standards in Construction industry organizations in Khartoum State in Sudan.

The research design that was used to conduct this paper, was quantitative approach, there was collection of both primary and secondary data. The primary data was obtained using questionnaires collected from HSEQ implementation team, HSEQ management team and top management of the clients / Government Institutions, consultants and contractors. The data obtained were analyzed using the Statistical Program for Social Scientists (SPSS).

The analysis was carried out for data obtained from questionnaire and supported by secondary data. The results and conclusion found the effective integration in implementation the HSEQ

international standards create organizations and employees are responsible towards their works practice. This study recommended methods and suggestions to improve the HSEQ international standards performance in construction industry organizations in Khartoum State in Sudan.

Keywords: HSEQ Management Systems; International Standards; Construction Industry Organizations; Khartoum State in Sudan.

I. INTRODUCTION

The Sudanese Construction industry is caracterizad by many small and large projects and high labour intensity; it is also highly dependent on public regulations and public investments. The Sudanese construction industry also has a number of factories and material suppliers that provide building materials and specialist fittings. The scope of Sudanese construction industry is very wide, includes residential construction, building construction of commercial, irrigation, roads, tunnels, transportation, facility building, and heavy engineering construction refer to infrastructure construction and industrial construction. The construction sector is an important to the Sudan economy; the construction sector accounted for 3.2% of the country's GDP in 2009 and grew by about 10% in 2010 in nominal terms, according to the Central Bank of Sudan [3].

The main focus of the construction industry is to ensure that projects are successfully completed within the best quality, stated period and at minimum cost possible [4].

This study was to evaluated, investigated HSEQ policies, procedures according to international standards and to examine the challenges in the management of HSEQ in construction industry organizations in Khartoum state to provide methods and suggestions to improve the HSEQ performance in construction industry in the Khartoum State.

The implementation of international standards in construction industry ensure projects are successfully completed within the best quality, stated period and at minimum cost possible.

So, the international standards are an effective tool to optimize the resources to implement and maintain environmental, quality and occupational safety and health systems.

The objective is to promote the improvement of the quality of the constructed facility, to reduce the environmental pollution and to reduce the occupational accidents and professional diseases.

Societal demands (environmental), client's demands (quality, including cost and time constraints) and workers' demands (occupational safety and health), as well as legislative requirements, the fulfilment of legal obligations, a better image for stakeholders and the wider demonstration of concern for society and primary forces leading the industry to a better quality of life for all partie. [1]

The international standards in construction industry such as "OHSAS 18001" for health and safety management system, " ISO 14001" for environmental management system and " ISO 9001" for quality management system, is meant to improve efficiency and effectiveness of the organizations and overall construction project site process lead to formulizing of successful business strategies in meeting international standards [2].

These international standards have developed individually, independently and at different times fulfilling unique demands. However, the structural similarities in the standards have led to the evolution as integrated systems (HSEQ). The objectives of this study are to review and evaluate the existing international standards on health, safety, environmental and quality; to study the mechanism of implementation HSEQ measures used on construction industry.

According to [5] the image of the construction industry in Sudan needs improvement. Specially the factors affecting the construction health, safety, environmental and quality in Sudan, especially in the Khartoum State, in the negative way, such as the severe competitive tendering methods, the age of the workers, experience, the lack of training on workers and the main concern of the management on productivity with ignorance of health, safety, environmental and quality (HSEQ) issues. HSEQ is one of the obstacles in the direction to developing the construction industry in Sudan. The concern should be addressed along the way to improve the HSEQ performance in the construction industry in the Khartoum State.

Improving health, safety, environmental and quality in Sudan requires the implementation of local laws and regulations and international standards [2]. The number of local regulations, and laws that are related to (HSEQ) in construction industry has been issued for this purpose as following:

A. Labour law-1997 - amendment 2000.
B. Standards and metrology law-2008.
C. Law of construction regulations-1997- amendment 2000.
D. Occupational health law- Khartoum state - 2011.
E. The engineering council law-1998.
F. Environmental protection law- 2001.
G. Environmental health law- 2009.
H. Civil defenece law- 2005. [1].

II. METHODOLOGY

This study comprises of the method and the design that was used to conduct the research. It was quantitative research in which the data was collected using questionnaires. A total of 37 construction industry organizations were selected from the list of local and foreign registered organizations based in Khartoum state. The population was consisted of key persons who are well familiar about the construction industry organizations, such as general managers, project managers, site managers, HSEQ managers, site engineers, and HSEQ team who were selected by random sampling. The 150 copies of the questionnaire were distributed and the returned copies were 100 respondents which included 53 contractors, 17 consultants, and 30 client / government institutions.

The questionnaire is categorized into two sections as shown below:

1- Section "A": Is related to the Personal Information which represent the qualifications, organizations types, experiences and position in organization.

2- Section "B": What is the mechanism of implement the HSEQ international standards in construction site work? This section includes 36 questions were design based on the 5-point Likert scale which measures from 1-5 according to the level of contribution and

impact of each factor. Strongly Agree (5), Agree (4), Moderate (3), Disagree (2), Strongly Disagree (1).

III. RESULTS AND ANALYSIS

The statistical tests and analysis that carried out for the questionnaire of the mechanism of implementation HSEQ international standards in construction site work in Khartoum state carried out using the SPSS. The Cronbach Alpha test that was carried out shows the validity of the questionnaire. The results were represented using tables and descriptive statistics such as the bar charts, pie charts, and the mean.

Table-1. The Questionnaire Sections

Section	Question	N of items
Section (A)	Personal information	**5**
Section (B)	What is the mechanism of implement HSEQ international standards?	**36**
Total number of items		**41**

Section Question N of items Section (A) Personal information 5, Section (B) What are the mechanism of implement the HSEQ international standards in construction site work? Total number of items 41.

A. Personal Information

The first part of the questionnaire was about personal information about the respondents such as (Qualifications, Type of Business, years of experiences and Positions in organizations) as the following:

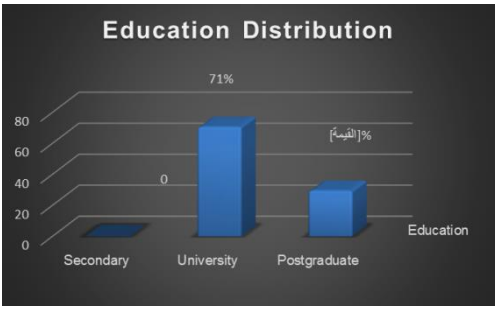

Fig. 1 Bar Chart of Qualifications of the Participants.

The results above clearly show that out the 100 returned questionnaires, (0%) had high school qualifications, (71%) had Bachelor qualifications, and finally (29%) had Master / Doctor Qualifications. Majority of our participants for the survey were very qualified in the construction industry. This shows that the results we will obtain will be valid. The organizations types of the participants as shown in Figure 2.

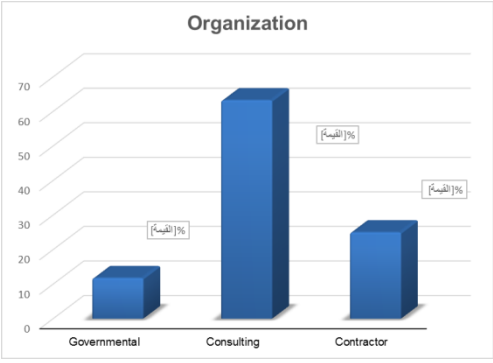

Fig. 2 Bar Chart of Organizations Types of the Participants.

The results indicate that out of 100 returned questionnaires, (12%) were answered by government institutions employees that working on construction industry, (63%) were responded to by consultants and (25%) were answered by contractors. The organizations scope of the participants as shown in Figure 3.

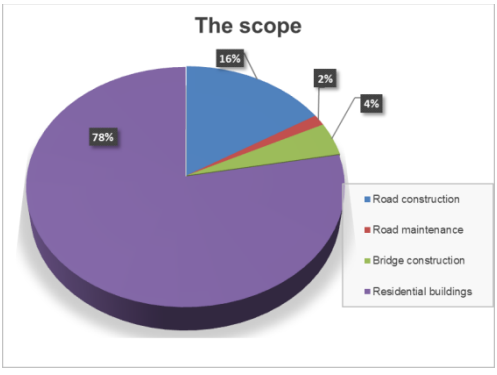

Fig. 3 Pie Chart of Organizations Scope of the Participants.

The results indicate that out of 100 returned questionnaires, that most civil engineering companies work on residential buildings at a rate of (78%) of the study sample, while the percentage of companies that work on building roads is (16%) and companies that work on building bridges (4%) and only 1% work on maintenance Roads.
The experiences of the participants as shown in Figure 4. The results in figure 4. show that out the 100 returned questionnaires, (40%) of the respondents had less than 5 years of working experience, (34%) of the respondents had 5-10 years of working experience, (26%) respondents had Above 10 years of working experience. Majority of our participants for the survey were very experienced professionals in the construction industry. This shows that the results we will obtain will be valid.

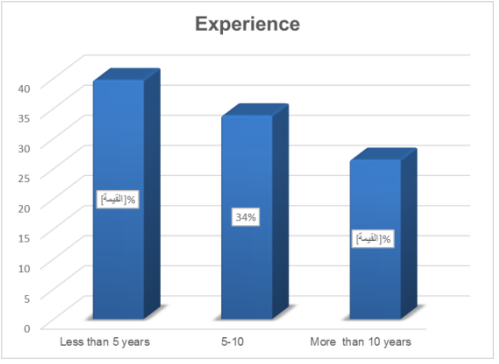

Fig. 4 Bar Chart of Experiences of the Participants.

The Positions in Organizations of the Participants as shown in Figure 5.

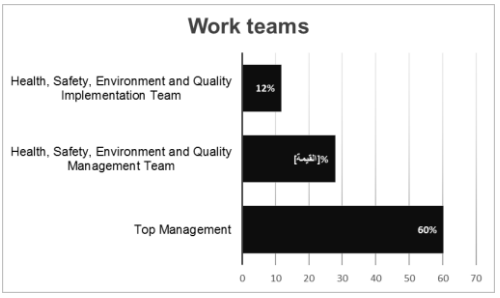

Fig. 5 Bar Chart of Positions in Organizations of the Participants.

The results indicate clearly that out of 100 returned questionnaires, (12%) were answered by HSEQ implement team, (28%) were answered by HSEQ management team and (60%) were answered by top management.

In section (B) a Cronbach analysis was carry out to ascertain the reliability of the questions. This test measured the internal consistency using the Likert scale for the questions that was correlated to each other as a group. This reliability test was conducted for this section. The results were represented on the table below:

Table-2. Reliability & Validity Statistics of Section (B).

No of Items	Reliability	validity
36	.931	0.965

The results from the tables 2. For Cronbach analysis indicate that all the items for the section is correlated and internal consistencies and the items functions as group. This is because the Cronbach Alpha coefficient high and close to 1. The validity was calculated from the square root of the reliability coefficient. Therefore, we concluded that our test and questions were reliable and validity.

Table-3. Shows the Weighted Mean and Level / Opinion of the Respondents.

Weighted mean	Level / Opinion
1-1.80	Disagree
1.81- 2.6	Less agree
2.61 – 3.40	Moderate Agree
3.41 – 4.20	Agree
4.21 – 5.00	Strongly Agree

The results from the table 3 show the 5- point – Likert scale weighted mean and Level / Opinion the interval period (4/5) = 0. 8 for each point to determine the attitude.

B. Mechanism of implement HSEQ international standards on construction project site.

What is the mechanism of implement HSEQ international standards on construction project site, in Section (D) or the fourth question the mechanism of implement HSEQ international standards on construction project site presents statistical tests and analysis using

tables such as the chi- square test such as chi- square test, df, Asymp. Significant and attitude.

The Chi- square test for responses of participants of the survey as shown in Table 4. HSEQ and international standards related to Out (for sites).

Table-4.

	Observed N	Expected N	Residual	Percent	Chi-Square	df	Asymp. Sig.
	128	354	-226	7%	21.8412	4	0.002
Disagree	214	354	-140	12%			
Neutral	643	354	289	36%			
Agree	481	354	127	27%			
Strongly agree	302	354	-52	17%			
Total	**1768**	**1768**	**0**	**100%**			

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 354
b. Observed N = ∑ answers of axis
c. 1768=26*68

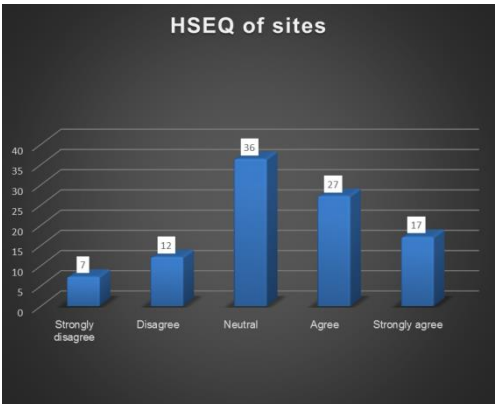

Fig. 6 Bar Chart of HSEQ and international standards related to Out (for sites).

Table 4. HSEQ and international standards related to Out (for sites). The Chi- square test was carried using SPSS to determine if there are significant. The results of the test in table Table4.that the value of K-Square (21.8412) at a degree of freedom 4 is statistically significant at a level of significant significance 0.002, which is less than the level of significance 0.05, which confirms that The methods and mechanisms available to improve HESQ implementation in the construction sector have positive impacts on project success in the sites.

The results from the table 4. show the respondents agrees for that the lanes and traffic safe in the project site, develop appropriate measures for the storage of hazardous materials, fire alarm be audible to everyone all over the site and risk analysis for works at site project. In the other items of this section the respondents explained that they are moderate agree of the inclusion of the relationships of HSEQ on construction project site with the HSEQ international standards in terms of what is stated in those terms.

This shows that less awareness for importance knowledge of relationships HSEQ on construction project site with the HSEQ international standard.

IV. CONCLUSION

The construction industry is a development tool for achieving goals in modern society. The conclusions for this research have been deduced after the analysis of the questionnaire. The mechanism of implement the HSEQ international standards in construction industry organizations confined to top management to determine and documented the HSEQ policies, roles and responsibilities, compared actual performance with the goals and objectives and emergency preparedness and response.

As for the others of the organization team, it turns out, they are not aware the mechanism of implement the HSEQ international standards in construction industry organizations, this shows that less awareness for importance knowledge of relationships HSEQ in organizations with the HSEQ international standards. So, there is no specific mechanism to implement the HSEQ international standards in construction industry organizations.

The study concluded that the HSEQ international standards in construction industry are often ignore and look at it as cost factor.

REFERENCES

1. Alves Dias, (2003). Integrated Management Systems in Construction (IMSinCONS), CIB Publication, Department of Civil Engineering and Architecture, Lisbon – Portugal.
2. Bhutto, K, Griffith, A and Stephenson, P (2004). Integration of quality, health and safety and environment management systems in contractor organisations. In: Khosrowshahi, F (Ed.), 20th Annual ARCOM Conference, 1-3 September 2004, Heriot Watt University. Association of Researchers in Construction Management, Vol. 2, 1211-20.
3. Hakami, Waleed and Mohamed Ibrahim, (2014). The effect of project life cycle's stages on Sudanese construction projects, KICEM Journal of Construction Engineering and Project Management Online ISSN 2233- 9582.
4. Ilias said et. Al. (2014). Factors affecting construction organization quality management system in the Malaysian construction industry, Malaysia.
5. Maki , Amal H. (2016). Investigation safety performance in construction projects in Khartoum state, M.Sc. thesis, construction management, civil engineering.