SOCIAL ENREPRENEURSHIP: IMPACT OF OCCUPATIONAL HEALTH AND SAFETY (OHS) FACTORS ON WORKERS' BEHAVIOR IN DIFFERENT CONSTRUCTION SECTORS IN OMAN

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ABSTRACT

PURPOSE

This paper critically analyzes and assesses the various factors of occupational health and safety (OHS), and elucidate the factors affecting construction workers' behavior in different construction projects of Oman. It aims to create Occupational Health and Safety awareness in construction workers working for Social Entrepreneurs in Oman.

DESIGN/METHODOLOGY/APPROACH

Two hundred and fifty-two construction workers from various projects were selected based on a simple random sampling basis, and the data was collected through a well-defined questionnaire.

FINDINGS

The study shows that workers favor communication in the improvement of workers' behavior in the industrial and infrastructure construction projects.Education and training help in capacity building and skills development and contributes towards sustainable positive OHS result in petrochemical construction projects. Management commitment plays a major part to maintain a sustained hazard free environment in building construction projects. The study also shows that the Occupational Health and Safety (OHS) factors –OHS policies, health care, communication, management commitment, education and training and workers' behavior, have a direct impact on health and safety results towards social entrepreneurship of creating awareness in the construction sectors of Oman.

RESEARCH LIMITATIONS/ IMPLICATIONS

A model named Construction Industries Influencing Factors Framework (CIIFF) Model, has been developed with the orientation of workers' behavior which can be developed further making improvements in the existing mechanism and the factors influencing can be dealt with wider procedures to ensure improvements.

SOCIAL IMPLICATIONS

The model may help in creating tools that are more effective to reduce Occupational Health and Safety related accidents and property damages in a construction project.

KEYWORDS – *Occupational health and safety, construction projects, Key-factors, construction workers, Social Entrepreneurship, Impact of Occupational Health & Safety factors.*

INTRODUCTION

Social entrepreneurs not only create social benefits but also have the capability to create shared values, ability to grow and turn out to be self-sustaining. This paper provides a summary of happenings and studies regarding factors affecting Occupational Health and Safety (OHS) in the construction industry of Oman and how social entrepreneurship can create awareness to avoid risk. Social Entrepreneurs carry the concept of social innovations forward and can deploy a more holistic model of OHS management. It has started to explore new environments to improve the safety of people at work.

In Finland, social enterprises patterned on international examples and research, are expected to enhance the quality of public services, create innovations, improve output and have a preventive effect on detrimental social and health issues among the population.

In social entrepreneurship, project construction management from all stakeholders (contractor, consultant, and client) has to be aware of the factors influencing the occupational health and safety (OHS) at the construction site. Lee and Jaafar (2012) opined that to strive for improvement and take the industry towards zero accidents, factor elements should be prioritized as a proactive means to manage safety. Numerous fatal and non-fatal incidents occur at the construction sites. Elimination of these incidents is not an easy task, but minimizing them is possible by carefully understanding the factors causing them and introducing proper procedures and policies for OHS.

As per Torner and Pousette (2009), workplace safety priority is expressed and illustrated through safety policy. Standard policies with high characteristics will control positive management attitude, prescribed conditions, shared values, and personal attitudes that will nurture better safety performance. Integrated International standards supplement to have clear cut policies and approach to govern them. Occupational health and safety related risks can be controlled by handy standards such as OHSAS 18001.

Along with appropriate safety policies, Management support and commitment play an important role in the success of implementation of the OHS program, in turn, which enhances the safety performance at job sites (Ndegwa, Guyo, and Orwa,2008;Haadir and Panuwatwanich., 2011). Personal factors likeattitudeplay an important role towardssafety; the concern stakeholders necessarily are workers, supervisors, and management. Both the parties the management and workers/ staff/ supervisors have substantial potential to reinforce the site safety. Safety inspection, regulation, enforcement, education, communication, and meetings are five elements of safety management activities as suggested by Fang et al. (Fang et al., 2004). Safety inspections can be used as a tool to benchmark the continuous improvement at sites. It can also be said that the larger the company, the better the Occupational health safety management (OHSM) practices and vice verse (Nordlof et al., 2017)). Management's leading role in the OHSMS component is key to lower injury, illness and accident rates. OHSMS continuous monitoring is an important part of integrated risk management approach(Autenrieth et al., 2016).Management should also commit itself towards pre- employment and regular health checkup of workers, to avoid occupational health issues (Chan, Leung. and Liu., 2016).Addiction to smoking, drugs, and alcohol, some debilities, etc. influence occupational injuries (Chau et al., 2004). Stress increasing factors are a heavy workload, limited social support, and limited control. The construction industry is identified as to be in top ten high-risk industries so far as the occurrence of high-risk disorders such as musculoskeletal disorders (MSD), (Ran Guo et al.,2004). The worker ergonomic conditions on the job have animpact on the safe working conditions. Better the ergonomic posture the lesser is the accident/injury rate (Ramnath et al., 2014).In Egypt construction industries, most common type of ailment is eye disease (23.6%), next being respiratory problems (11.5%) and heart-related problems (11.5%), (Alazab, 2004). Tam et al. (2004) have suggested that management should give more attention and highlight on sufficient education and training to guarantee that all personnel is well aware of safety matters and familiar with working environment at sites. The education and training will equip all personnel with sufficient safety awareness to mitigate potential accidents. E-Learning for migrant workers can be an effective tool to improve their safety knowledge, behavior accuracy, credibility and novelty of learning (Lee and Lee, 2015).Employment of suitable workers with sufficient education and skill plays an important part in site safety. Safety sign boards near every important location, daily toolbox talks, sharing of incidents and action plans, involvement in safety improvement programs, etc. are important management tools for effective communication with workers. Management commitment is a prerequisite to promulgate safety related information to workers and provide a healthy channel of communication between workers to encourage participation in the joint problem-solving process. Such practice will help improve safety performance at sites. (Michael et al., 2006; Kim et al., 2008; Kines et al., 2010; Zubar et al., 2014).Workers behavior is a vital factor which decides safety performance in a construction industry. Common flaws observed are an improper use of personal protective equipment (PPEs), ignore hazard warning signs at site, overconfidence, etc. (Cheng et al.,2010).

A literature review is performed to identify OHS tasks associated with construction industry before studied thru the world. Along list of construction, OHS factors are identified and shortlisted. The six factors with forty-two-subfactorsare short-listed. The writers have focused on these factors in their research on the execution of OHS directions in different construction sectors (Industrial, Infrastructure, petrochemical, utility and building projects) in Oman.

OHS factors identified are further divided into sub-factors. OHS policy factor is split into sub-factors such as working tools and equipment's, personal protective equipment's, financial incentives, moral incentives, crafts professional,

work permit and OHS control officers. Subfactors for health care are medical evaluation, health insurance, regular health check-ups, life insurance, family medical care family health insurance. Communication factor is divided intosubfactors like Oral communication, communication in workers language, emergency call number, emergency exits, emergency assembly point, signboards, incidents information and awareness campaigns. Subfactors for workers behavior are working long hours, over-confidence, use personal protective equipment's (PPE), use right tools, follow work permit, proper posture and violate rules. Subfactors for Education and training are Technical, procedure, OHS equipment's, OHS induction, craft certificate, OHS orientation program. Management commitment factor is sub divided into OHS planning, OHS suggestion collection, right to refuse, toolbox talk, staff-regular visit, OHS rules emphasize and OHS disciplinary actions.

RESEARCH METHODOLOGY

The laborer's survey utilized as a part of this review contained forty-two sub-factors and the respondents expected to answer every one of the things utilizing Likert-scale. The reactions gathered from construction workers of various Industries over Oman through individual and telephone contacts. The impression of the construction worker in every protest caught in the comparable mold as service.

The survey conducted through different modes of collecting responses over a period of nine months (from Jan 2016 to September 2016). It carried out in the eastern zone of the country. Two hundred eighty-nine workers questionnaires sent and two hundred fifty-two responses (87%) received. Out of which 88.9% are below high school level, 9.9% are high school level and remaining 1.2% ITI (Industrial Technical Institute). It also observed that 8.7% are below 5 years of experience, 61.9% are 6-10 years of experience, 19% are 11-15 years of experience, 6.3% are 16-20 years of experience and 4% are more than 20 years of experience. Two hundred fifty-two responses using the regression analysis are suitable for the model using SPSS 20.00.

FINDINGS

The data on the forty-two sub-factors is located for the principal component analysis with Varimax rotation. Thirty-fivesub-factorsare loaded more than 0.6. For the sub-factors health insurance, family medical care, technical training, communication workers language by written, use personal protective equipment's, over confidence and long working hours (total 7sub-factors) the factor loadings are found to be less than 0.6 and therefore removed for further analysis (Hair et al. 2010). Cronbach's Alpha is used to test the reliability of the survey data. Cronbach alpha score found to be 0.894, i.e., greater than 0.7 an acceptable value (Hair et al., 1998).

REGRESSION ANALYSIS

In the regression analysis, the five factors (OHS policies, health care, communication, education& training and management commitment) are used as an independent variable to test their impact on the dependent variable (workers' behavior) regarding the implementation of OHS at construction projects. Regression analysis is conducted separately for the following construction sectors: Industrial, Infrastructure, Petrochemicals, Utility and Buildings.

FOR INDUSTRIAL PROJECTS

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Communication, Management commitment		Enter

[a] Dependent Variable: Workers behavior

[b] All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.625[a]	0.391	0.361	0.62916

[a] Predictors: (Constant), Communication, management commitment

From the above table, it can be seen that 39.1% of the respondents are influenced by the equation given below.

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.166	2	5.083	12.842	0.000[b]
Residual	15.834	40	0.396		
Total	26.000	42			

[a] Dependent Variable: Workers behavior
[b] Predictors: (Constant), Communication, Management commitment

Coefficients[a]

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error	Beta		
(Constant)	9.059	1.061		8.535	0.000
Management commitment	-0.108	0.048	-.0340	-2.273	0.028
Communication	0.206	0.041	0.752	5.020	0.000

[a] Dependent Variable: Workers behavior

From Coefficient table the p-value is 0.000 is $0.000 < 0.05$, thus a linear regression can be derived as follows:

Workers behavior = 9.959 + (- 0.108) b+ 0.206 e

  b = Management commitment, e = Communication

The above equation shows that there is a relationship between the factors viz. management commitment and communication. However, it can be observed that the factors 'Communication' have a direct, positive and highest impact on the workers' behavior towards OHS.

For Infrastructure projects

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Communications		Enter

[a] Dependent Variable: Workers behavior
[b] All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate

| 1 | 0.812[a] | 0.659 | 0.654 | 1.234 |

[a] Predictors: (Constant), Communication

From the above table, it can be seen that 65.9% of the respondents are influenced by the equation given below.

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	217.771	1	217.771	143.054	0.000[b]
Residual	112.650	74			
Total	330.421	75	1.522		

[a] Dependent Variable: Workers behavior
[b] Predictors: (Constant), Communication

Coefficients[a]

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error	Beta		
(Constant)	-2.872	1.225		-2.433	0.022
Communication	0.537	0.045	0.812	11.961	0.000

[a] Dependent Variable: Workers behavior

From Coefficient Table the $p-$ value is $0.000 < 0.05$, thus a linear regression can be derived as follows:

Worker behaviour = -2.872 + 0.537e

e = Communication

The above equation shows that there is a relationship between the factor communications. However, it can be observed that the factors 'Communication' have a direct, positive Impact on the workers'behavior toward OHS.

For Petrochemical projects

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Communication, Education and training		Enter

[a] Dependent Variable: Workers behavior
[b] All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.699[a]	0.489	0.462	0.0375

[a] Predictors: (Constant), Communication, Education &Training

From the above table, it can be seen that 48.9% of the respondents are influenced by the equation given below.

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.100	2	2.550	18.150	0.000[b]
Residual	5.339	38	0.140		
Total	10.439	40			

[a] Dependent Variable: Workers behavior
[b] Predictors: (Constant), Communication, Education &Training

Coefficients[a]

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error	Beta		
(Constant)	26.337	2.386		11.036	0.000
Education & Training	0.121	0.025	0.901	4.911	0.000
Communication	-0.549	0.091	-1.102	-6.011	0.000

[a] Dependent Variable: Workers behavior

From coefficient table the *P*- Value is $0.000 < 0.05$, thus a linear regression can be derived as follows:

Worker behavior = 26.337 + 0.121 d + (-0.549) e

 d = Training and education, e = Communication

The above equation shows that there is a relationship between the factor education & training and communication. However, it can be observed that the factors 'Education and training' has a direct, positive Impact on the workers'behavior toward OHS.

For Utility projects

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Management commitment		Enter

[a] Dependent Variable: Workers behavior
[b] All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.490[a]	0.241	0.221	0.319

[a] Predictors: (Constant), Management commitment

From the above table, it can be seen that 24.1% of the respondents are influenced by the equation given below.

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.227	1	1.227	12.034	0.001[b]
Residual	3.873	38	0.102		
Total	5.100	39			

[a] Dependent Variable: Workers behavior
[b] Predictors: (Constant), Management commitment

Coefficients[a]

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error	Beta		
(Constant)	15.112	0.855		17.666	0.000
Management commitment	-0.116	0.033	-0.490	-3.469	0.001

[a] Dependent Variable: Workers behavior

From coefficient table the p– value is 0.000 < 0.05, thus a linear regression can e derived as follows:

Worker behavior = 15.112 + (-0.116) b

 b = Management commitment

The above equation shows that there is a relationship between the factor management commitments.

For Buildings Projects

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Communication, Management Commitment		Enter

[a] Dependent Variable: Workers behavior
[b] All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.504[a]	0.254	0.224	0.237

[b] Predictors: (Constant), Communication, Management commitment

From the above table, it can be seen that 25.4% of the respondents are influenced by the equation given below.

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.939	2	0.470	8.361	0.001[b]
Residual	2.753	49	0.056		
Total	3.692	51			

[a] Dependent Variable: Workers behavior
[b] Predictors: (Constant), Communication, Management commitment

Coefficients[a]

Model	Unstandardized coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error	Beta		
(Constant)	13.113	0.540		24.276	0.000
Management commitment	0.061	0.019	0.473	3.279	0.002
Communication	-0.085	0.022	-0.547	-3.791	0.000

[a] Dependent Variable: Workers behavior

From coefficient table the $p-$ value is 0.000 < 0.05, thus the linear regression derived is as follows:

Worker behavior = 13.113 + 0.061 b + (-0.085) e

  b = Management commitment, e = Communication

The above equation shows that there is a liners relationship between the factor management commitment and communication. However, it can be observed that the factors 'Management commitment' have a direct, positive Impact on the workers'behavior toward OHS.

RESULTS AND DISCUSSIONS

The above findings indicate a unit increase OHS communication led to 0.206 increases in workers behavior in industrial construction projects. A unit increase in OHS communication leads to anincrease of 0.537 in workers behavior in infrastructure construction projects. In petrochemical construction projects, it is found that a unit increase of OHS training and education leads to 0.121 increases in workers behavior. A unit increase in management commitment for OHS results in 0.061 increases in workers behavior in building construction projects.

The above arguments give rise to a model we named it as Construction Industries Influencing Factors Framework Model (CIIFF Model) which is depicted in a diagram as follows:
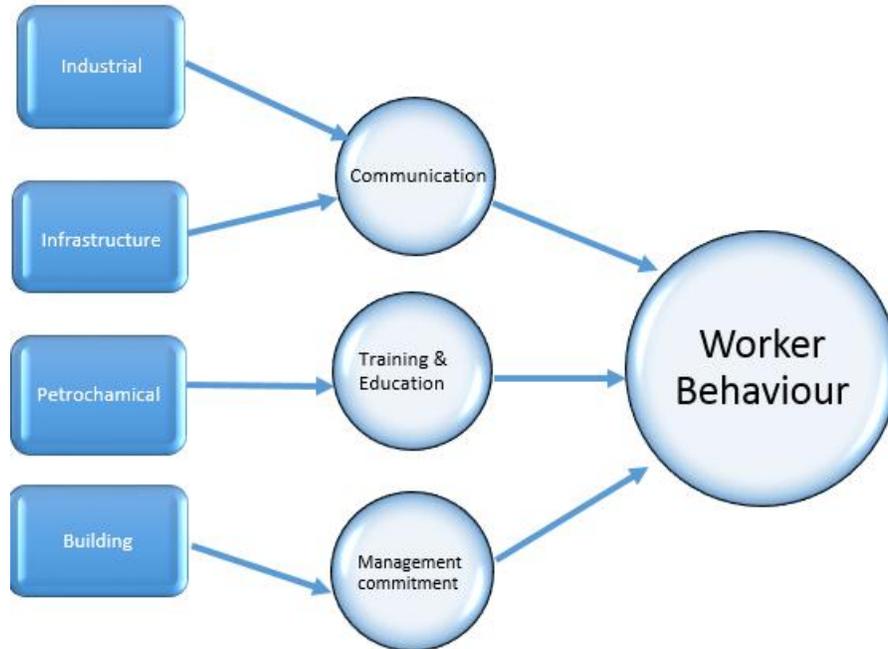

Fig.1. Construction Industries Influencing Factors Framework Model

CONCLUSION

Workers awareness is enhanced by continuous interaction and communication, which ultimately help in improvement of workers' behavior in industrial construction projects.

In infrastructure construction projects, workers prefer the communication in their native language, which can be understood easily and clearly.

Imparting procedural training in plant process may ensure improved perception and behavior of workers during project execution and plant commissioning time in petrochemical construction projects.

Management commitment such as conduction tool box talks and encouraging the workers to give suggestions is found to be very important to increase awareness and improve overall behavior of workers in building and utility construction projects.

Construction Industries Influencing Factors Framework (CIIFF) Model has a direct and positive impact on Occupational Health, and Safety (OHS) results in creating awareness of the Health and Safety issues – a social entrepreneurship towards the welfare of the workers in the construction industries of Oman.

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